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REPORT (REVISION1)

Subsurface Soil Exploration Study
Griffith Sanitary Landfill
Griffith, Indiana

Torrenga Engineering, Inc.
907 Ridge Road
Munster, IN 46321

Attn: Mr. Don Torrenga

K&S Testing and Engineering Inc.

9715 KENNEDY AVENUE • HIGHLAND, INDIANA 46322 • (219) 924-5231 • (312) 734-5900

Ncvember 16, 1988

File No. 220

Torrenga Engineering, Inc.
Engineers and Surveyors
907 Ridge Road
Munster, IN 46321

Attn: Mr. Don Torrenga

REPORT (REVISION1)

Subsurface Soil Exploration Study
Griffith Sanitary Landfill
Griffith, Indiana

Dear Mr. Torrenga:

We have revised our report, "Subsurface Soil Exploration Study, Griffith Sanitary Landfill, Griffith, Indiana," dated August 24, 1987 to include the results of additional soil exploration work and hydrogeological study performed in September, 1988. The above additional work was performed to resolve the comments by the Environmental Management Office of the State of Indiana (EMOSI), Indianapolis, Indiana (Reference: Ms. Nancy A. Maloley, Commissioner, Department of Environmental Management's letter to the late Mr. Glen Slaney, Board of Trustees, Griffith, Indiana, dated July 9, 1986) and per Mr. Billy Giles of EMOSI recommendations on August 26, 1988 (Reference: Torrenga Engineering and K & S Testing and Engineering's meeting with city of Griffith and EMOSI on August 26, 1988). This work was performed per your and the late Mr. Glen Slaney, Director, Public Works, Town of Griffith, Indiana's verbal authorization.

The scope of work was defined by Mr. Giles of EMOSI and consisted of drilling three additional soil borings (includes one boring for installation of a deep monitoring well), and installing five shallow and one deep monitoring wells. The location of the soil borings and monitoring wells were determined based on Mr. Giles of EMOSI's suggestions.

Again, we appreciate the opportunity to be of service to you and we hope this information is helpful. If you have any questions or need further assistance, please call.

Very truly yours,
K & S Testing and Engineering, Inc.

Satya N. Varadhi

Satya N. Varadhi, Ph.D.

Dibakar Sundi, P.E.
Vice President

SV:DS/krw

REPORT (REVISION 1)

Subsurface Soil Exploration Study
Griffith Sanitary Landfill
Griffith, Indiana

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Section 1

INTRODUCTION

The Griffith Sanitary Landfill site is located on the west side of the Colfax Avenue in the town of Griffith, Lake County, Indiana. To the north, the site is bordered by the C & O Railroad and to the south by the C & E Railroad property. The regional site location and the surface topography (based on USGS State of Indiana, Highland Quadrangle - 7.5 Minute Series), presented in Exhibit 1.

The landfill was opened for use in 1950 and has been in use since that time. The portions of this facility have been filled and the filled areas are identified as Phases 1 through 4 on Exhibit 2.

A geotechnical and hydrogeological study of the landfill site area was performed during 1986; and consisted of drilling three soil borings, SB-6, SB-7 and SB-8, and four soil borings, M-1 through M-4, for installation of the monitoring wells. A report, "Subsurface Soil Exploration Study, Griffith Sanitary Landfill," summarizing the results of the above geotechnical and hydrogeological study was prepared and submitted to Torrenga Engineering, Inc. of Munster, Indiana on August 24, 1987.

A meeting between the officials of the town of Griffith and the representatives of Environmental Management Office of the State of Indiana (EMOSI) was held in Griffith, Indiana on August 26, 1988 to discuss the comments of Ms. Nancy A. Maloley, Commissioner, Department of Environmental Management's letter to the late Mr. Glen Slaney, Board of Trustees, Griffith, Indiana, dated July 9, 1986. The other attendees of the meeting were Torrenga Engineering, Inc. (TE) of Munster, Indiana and K & S Testing and Engineering, Inc. of Highland, Indiana. As a result of this meeting and per Mr. Billy Giles of EMOSI's recommendations, additional soil exploration and hydrogeological study was performed in September, 1988. This additional study consisted of drilling three additional soil borings, SB-9, SB-10, and M-5 (for installation of a deep monitoring well), and installation of one deep (M-5) and five (M-1S through M-5S) shallow monitoring wells.

This report includes the contents (revised) of our original report, "Subsurface Soil Exploration Study, Griffith Sanitary Landfill," dated August 24, 1987, and the results of our additional work performed at the site in September, 1988.

Section 2

SUMMARY AND CONCLUSIONS

The subsurface explorations for the Griffith Landfill Site area consisted of (1) drilling three soil borings and installing four deep groundwater monitoring wells during 1986, (2) drilling three soil borings (includes one boring for installation of a deep groundwater monitoring well), and installation of five shallow and one deep groundwater monitoring well in 1988, and (3) a review of available published geological reports. The laboratory testing of representative soil samples consisted of index properties (Atterberg Limits), grain size distribution, moisture content and dry density, coefficient of permeability, unconfined compressive strength and cation exchange capacity (CEC). The groundwater samples obtained from the monitoring wells were tested in the laboratory for chemical analyses to determine the concentrations of pollutants.

The subsurface soils at the Griffith Landfill Site area, within the depth of our exploration, consists basically of three soil deposits: (1) The Upper Sands (or upper aquifer), (2) The Silty Clay (or aquiclude), and (3) The Lower Sands (or lower aquifer). The thickness of the upper sand deposit varies from 9.0 feet to 19.5 feet except at boring SB-6 location where it was excavated and removed before our soil exploration work. The coefficient of permeability, k, values for the upper aquifer vary from 0.3×10^{-2} cm/sec to 2.6×10^{-2} cm/sec. The upper aquifer is underlain by 12.0 feet to 34.7 feet thick aquiclude (silty clay). The thickness of this silty clay layer, at the monitoring well M-5 location (northwest corner of the site), reduces to 9.0 feet. The top of the aquiclude varies from elevation 620.31 feet MSL to 611.55 feet MSL, and the bottom elevations of the aquiclude vary from 607.95 feet MSL to 581.57 feet MSL. The coefficient of permeability, k, for the aquiclude varies from 3.6×10^{-8} cm/sec to 1.6×10^{-8} cm/sec and averages 2.3×10^{-8} cm/sec. The cation exchange capacity (CEC) values vary from 4.35 meq per 100 gm to 5.64 meq per 100 gm and average 5.2 meq per 100 gm. The liquid limit (LL) and plasticity index (PI) values of the aquiclude vary from 20 to 35 and 7 to 19, respectively. The corresponding average values of LL and PI are 30 and 14, respectively. The percent passing #200 U.S. Standard Sieve varies from 72.0 to 92.3. The aquiclude at the site is underlain by the lower aquifer (or lower sands). The k

values for the lower aquifer vary from 0.7 x 10^{-2} cm/sec to 5.7 x 10^{-2} cm/sec. This sand layer extends to the maximum depth of the borings drilled during our exploration work.

A total of five shallow groundwater monitoring wells (M-1S through M-5S) were installed in the upper aquifer and a set of five deep groundwater monitoring wells (M-1 through M-5) were installed in the lower aquifer. The water levels in the wells were measured and potentiometric surface maps were prepared, and the groundwater samples were collected from these wells and tested for chemical analyses at regular (quarterly) intervals. These data should be used as a base data for the groundwater monitoring work.

Based on the data presented in this report, the aquiclude present at the site between the upper unconfined aquifer and the lower confined aquifer appears to be continuous, with occasional drifts of sandy seams. The thickness, in general, is in excess of ten feet, with an exception of one area in the vicinity of M-5 in the northwest corner of the landfill site. The thickness of the aquiclude in this area is 9.0 feet. A minimum of one foot of clay liner should be provided in this area. The clay liner should consist of a suitable cohesive fill controlled and compacted to 95.0 percent of the maximum dry density per ASTM D1557. The average k value for the in situ clay (aquiclude) is 2.3 x 10^{-8} cm/sec; and the average value of Cation Exchange Capacity (CEC) is 5.2 meq per 100 gm. Therefore, the aquiclude (silty clay) present at the site is providing a significant protection against any leachate infiltration to the lower aquifer. The potential for surface or near surface horizontal migration of contaminants, if present at the site, may be likely, unless provisions are made to contain the leachate or prevent it to flow horizontally away from the site.

The groundwater flow in the upper and lower aquifers is towards northwest and north directions, respectively.

Section 3

SCOPE OF WORK

The geotechnical explorations were performed to assess the subsurface soil conditions and the suitability of the site for placing the new fill in the areas within the existing landfill site, and to determine any possible potential migration of the contaminants in the groundwater at the site. The scope of work performed consisted of the following:

- 1986 Geotechnical Exploration work
  - Drilling of three exploratory soil borings
  - Laboratory testing of soil samples including the Cation Exchange Capacity determinations
  - Installation of groundwater monitoring wells
  - Observation of groundwater levels
  - Chemical analysis of the groundwater samples
  - Geotechnical and hydrogeological assessment of the site

- 1988 Geotechnical Exploration work
  - Drilling of three soil borings (includes one boring for installation of a deep monitoring well)
  - Laboratory testing of soil samples including the Cation Exchange Capacity determinations
  - Installation of one deep groundwater monitoring well and five shallow groundwater monitoring wells
  - Observation of groundwater levels
  - Chemical analysis of the groundwater samples
  - Geotechnical and hydrogeological assessment of the site

Section 4

SUBSURFACE INVESTIGATIONS

A geotechnical exploration was performed at the site during January, February, November and December of the year 1986, and another geotechnical exploration was recently performed, in September, 1988. The results of these explorations are briefly summarized below.

BORINGS AND MONITORING WELLS

1986 Geotechnical Exploration

During January, February, November and December of 1986, a geotechnical exploration was performed at the site by K & S of Highland, Indiana as part of a site characterization study to determine the suitability of the site for using new areas within the existing landfill facility. This exploration work consisted of drilling three soil borings (SB-6 through SB-8, in January and February, 1986, and four soil borings M-1 through M-4, in November and December, 1986. The groundwater monitoring wells were installed in borings M-1 through M-4. The locations of the soil borings and the monitoring wells are shown on Exhibit 3. The soil borings were drilled with a truck-mounted rotary drill rig, D-50, using 3¼ in I.D. hollow-stem auger. The depth of the soil borings SB-6 through SB-8 varied from 25.0 feet to 54.5 feet, and the depth of the monitoring wells, M-1 through M-4, varied from 31.0 feet to 51.0 feet. A continuous soil sampling was performed in all the borings in accordance with American Society for Testing and Materials (ASTM) Standard D1586, "Standard Penetration Test and Split-Barrel Sampling of Soils." The logs of these borings are provided in Appendix A, and the details of the monitoring wells are presented in Appendix B.

1988 Geotechnical Exploration

An additional exploration work was performed at the Griffith Landfill Site in September, 1988 by K & S. This work was performed per Mr. Giles of EMOSI's suggestions and consisted of drilling three soil borings, SB-9, SB-10 and M-5, and installation of one deep groundwater monitoring well, M-5, and five shallow groundwater monitoring wells, M-1S through M-5S, adjacent to the deep monitoring wells, M-1 through M-5. The locations of these soil borings and the

monitoring wells are shown on Exhibit 3. The logs of the soil borings are included in Appendix A, and the details of the monitoring wells are provided in Appendix B. The depth of the soil borings varied from 31.0 feet to 50.0 feet, and the depth of the deep monitoring well, M-5, is 30.0 feet and the depths of the shallow monitoring wells varied from 11.5 feet to 19.5 feet. The soil borings were drilled with a truck-mounted rotary drill rig, D-50, using 3¼ in I.D. hollow-stem auger. A continuous sampling was performed in the borings in accordance with ASTM Standard D1586. An undisturbed soil sample was obtained in Boring SB-10 at approximately five feet below the anticipated excavation level for the new landfill area. This undisturbed soil sampling was performed in accordance with ASTM Standard D1587, "Thin-walled Tube Sampling of Soils." The monitoring wells, after installation, were developed by jetting with air. The air was injected into the well through a small diameter pipe (lowered into the well) under high pressure until the sediments in the bottom of the well are geysered out the top of the well.

LABORATORY TESTING

Representative soil samples from the borings were tested in the laboratory to determine the physical and strength characteristics consisting of index properties, grain size distribution, moisture content, coefficient of permeability and unconfined compressive strength. The above tests were performed in K & S's laboratory, Highland, Indiana and the results of the tests are included in Appendix C.

The cation exchange capacity (CEC) tests were performed on cohesive soil samples. The CEC tests on soil samples obtained from 1986 exploration work were performed by the Suburban Laboratories, Inc., Hillside, Illinois, and CEC tests of soil samples obtained from 1988 exploration work were performed by the Top-Soil of Frankfort, Illinois. The CEC test results are included in Appendix D.

Groundwater samples were collected from the monitoring wells and chemical analyses were performed in the laboratory to determine the concentrations of the pollutants. The testing of these samples was performed in Gulf Coast Laboratories, Inc. of University Park, Illinois and the Tenco Laboratories of Schererville, Indiana. The results of these analyses are provided in Appendix E.

Section 5

SITE CHARACTERIZATION

TOPOGRAPHY

The surface topography of the landfill area is shown on Exhibit 2. As shown in this exhibit, the topography of the unused portions of the landfill area varies from gentle slope to flat. The filled landfill area identified as Phases 1 through 4 is at higher elevation than the unused portions of the landfill area. A drainage ditch exists along the north side of the C & E Railroad, and another drainage ditch also exists on the south side of the C & O Railroad. These two ditches are connected by a drainage ditch existing at the western portion of the landfill site. As shown on the topographic map, excavations were made recently at a few locations on the western portion of the site near C & E Railroad property.

The ground surface surrounding the landfill site area is relatively flat, with elevations approximately 630.00± feet MSL. Locally, on the eastern edge of the site, the surface topography is at a higher elevation.

SUBSURFACE CONDITIONS

The subsurface conditions described in this report are based on our geotechnical exploration work performed in 1986 and 1988, and in conjunction with the previous soil exploration work and the available published geological literature.

Site Geolgoy

The site is formed of sediments deposited late during the Wisconsin Age as lake-bottom and near shore deposits of Glacial Lake Chicago. These sediments consist of fine lake silt and clay, sand and fine gravel laid down as glacial outwash and as till inclusions, and clay-rich till units of varying thickness. The site is a part of the Calumet Lacustrine Plain, which is a geologically heterogeneous area that has interbedded sand, lake clay and till forming the bulk of the sedimentary units. These sediments are water-laid sands and clays; the wind-blown dune sands being next in abundance. The deposits in a parti-

cular locality, whether wind or water-laid, sand or clay have very similar strength properties. The physiographic units in the regional site area is shown in Exhibit 4.

Overburden Soils

The overburden soils, within the depth of exploration, at the Griffith Landfill Site area consist of three distinct soil units. These units, from the surface, are: 1) Upper Sand, 2) Silty Clay and 3) Lower Sand deposits. A detailed description of the soils encountered are shown on the boring logs. The generalized subsurface profiles, Sections A-A, B-B, C-C and D-D are presented in Exhibits 5, 6, 7 and 8, respectively. The ground surface elevation in the undisturbed areas is approximately 630.00 feet MSL.

Upper Sands. The upper sand deposit was encountered in all the borings except at SB-6 location where it was excavated and removed. The thickness of the sand deposit, at the site, varies from 9.0 feet to 19.5 feet. The sand deposit consists of very loose to loose, brown, dark brown and gray, silty fine sand at the surface and is underlain by medium dense, gray, fine to coarse sand. This layer, at a few locations, is interbedded with thin layers of cohesive soils including the peat deposit. The coefficient of permeability, k, values for this deposit were estimated based on empirical relationships using D_{10} (Hazen's Formula) and D_{20} (USBSC Formula) values. Based on these estimations, the k value varies from 0.3×10^{-2} cm/sec to 2.6×10^{-2} cm/sec. The upper sand deposit is underlain by silty clay deposit.

Silty Clay. The silty clay layer was encountered in all the borings. The depth to the top of this layer varies from 9.0 feet to 19.5 feet with an exception of SB-6 location where it is zero. The elevations of the top of the clay layer vary from 620.31 feet MSL to 611.55 feet MSL. The soil unit consists of stiff to hard, gray, silty clay. The thickness of this layer, in general, varies from 12.0 feet to 34.7 feet. However, at M-5 location, which is at the northwest corner of the site, the thickness of the silty clay layer is 9.0 feet. This soil deposit, at a few locations (SB-6, M-1 and M-4), is interbedded with thin layers of sand.

The laboratory tests were performed on representative samples of this soil

unit and consisted of the following tests:

- Atterberg limits (liquid and plastic limits)
- Grain size analysis
- Moisture content and dry density
- Unconfined compressive strength
- Coefficient of permeability, k (on shelby tube samples)
- Cation exchange capacity (CEC)

The laboratory test results are included in Appendixes C and D. Based on the test results, the liquid limit (LL) and plasticity index (PI) vary from 20 to 35 and 7 to 19, respectively. The corresponding average values of LL and PI are 30 and 14, respectively. The percent passing #200 U.S. Standard Sieve varies form 72.0 to 92.3. The coefficient of permeability, k varies from 3.6×10^{-8} cm/sec to 1.6×10^{-8} cm/sec and averages 2.3×10^{-8} cm/sec with an exception of a value 1.6×10^{-6} cm/sec. The relatively high k value of one sample was due to more silt content (CL-ML) in the sample.

Based on the CEC test results, the CEC values for the silty clay soil unit vary from 4.35 meq per 100 gm to 5.64 meq per 100 gm and average 5.2 meq per 100 gm. The above CEC test results are based on Ammonium Acetate Method in accordance with Method 9080 per United States Environmental Protection Agency (U.S. EPA) SW-846, "Test Methods for Evaluating Solid Waste, " Volume 1C, September, 1986. The sample ST-1 from boring SB-10 was also tested using two additional methods such as Method 9081, Sodium Acetate Method per U.S. EPA SW-846 and the Summation Method per American Society of Agronomy (ASA) Methods of Soil Analysis. As shown in the Appendix D, the CEC values, based on these two methods, are higher than those based on Ammonium Acetate Method, particularly, the Summation Method results are much higher.

The bottom of the silty clay deposit varies from elevation 607.95 feet MSL to elevation 581.57 feet MSL. The silty clay deposit is underlain by lower sand soil unit.

Lower Sand. The lower sand deposit was encountered in all the borings. The top of this soil unit varies from 20.5 feet to 49.0 feet below the existing

ground surface and extends to the maximum depth of the borings. This soil deposit consists of medium dense to dense, gray, fine to coarse sand. The k values for this deposit were estimated based on empirical relationships using D_{10} (Hazen's Formula) and D_{20} (USBSC Formula) values. Based on these estimates, k values vary from 0.7×10^{-2} cm/sec to 5.7×10^{-2} cm/sec.

Bedrock

Bedrock was not encountered within the maximum depth of drilling (55.0 feet). However, published geologic information accounts for the consolidated rocks of Lake County, which consists of more than 4,000 feet of limestone, dolomite, sandstone and shale of the Cambrian Age through Devonian Age, which rests on a granitic basement that is designated Precambrian. The rocks constitute a series of strata that are relatively flat lying, but that are gently flexed to form a saddle-like structure. This saddle, a part of the Kankakee Arch, rises between the Michigan Basin to the northeast and the Illinois Basin to the southwest. Structural dip or inclination of the bedrock units, is generally southeastward, although the dip is northwestward in the northeast sector of Lake and Porter Counties. The average dip is about 5 to 7 feet per mile. The major bedrock structural features of the Indiana State are shown in Exhibit 9.

The bedrock surface which lies beneath 15 to 270 feet of unconsolidated glacial material, is largely a preglacial erosional feature and is not reflected by the present glacially derived land surface. The highest and coincidentally the shallowest area of bedrock lies under the Kankakee Plain in southern Lake County. This bedrock high is part of a northeast-southwest trending ridge of Devonian limestone and shale in the southern part of the two counties. The surface drainage was northward from all but the south edge of the area. This bedrock ridge was the drainage divide. Bedrock elevation ranges from a low of about 450 feet above sea level near Lake Michigan to a high of about elevation 650 feet on the ridge in the south, under the Kankakee Plain. The bedrock surface elevation of our study site is expected to be within the elevation of 500 feet to 550 feet, or within 80 feet to 130 feet below the existing site surface. The regional rock surface contour map is shown in Exhibit 10.

Groundwater

The groundwater levels were measured during and 24 hours after drilling.

Based on the measurement of these levels, the depth to groundwater in these borings varied from 1.5 feet to 11.0 feet.

Hydrogeology

Regional Hydrogeology. The regional hydrogeology in the Lake County area can be typified by a thin upper mantle of water-bearing soils approximately 20 feet thick. The water source is primarily direct infiltration of precipitation, and these deposits generally drain to the nearest waterway leading to the Calumet River and then to Lake Michigan. The area is fairly level and the natural drainage is low. The relatively recent urbanization has extensively modified the topography by creating ditches and drains. The regional potentiometric surface map is shown in Exhibit 11.

Clayey glacial tills underlie these water-bearing soils and form an effective aquiclude. The till is homogeneous mixture of sand, silt and clay with predominantly silt and clay size particles. These silt and clay size particles form a relatively impermeable soil matrix. Stratified drifts of coarser materials are present below the upper clayey till.

Underlying the till is the Devonian shale and limestone, and Silurian dolomite and limestone, which are considered to be a source of partial potable water supply. This bedrock aquifer is most productive, and it has the greatest water supply potential. Contamination from the surface is not as great in the shallow bedrock as it is in the unconsolidated system.

Site Hydrogeology. The site hydrogeology, in general, is similar to the regional hydrogeology. The groundwater flow at the site is controlled primarily by the direct infiltration of rainfall. The existing ditches on west and north sides of the site area intercept the groundwater and serve as drainage from the site. The site area is underlain by the upper and lower aquifers, separated by an aquiclude in the middle.

- Upper Aquifer

  The thickness of the upper aquifer varies from 9.0 feet to 19.5 feet and is unconfined. The upper portion of this aquifer consists of very loose to loose, silty fine sand and the lower portion is medium dense,

fine to coarse sand. The upper aquifer, at a few locations, is interbedded with relatively thin layers of cohesive soils including the peat deposit. Based on the grain size analysis and empirical relationships, the k values for this aquifer vary from 0.3 x 10^{-2} cm/sec to 2.6 x 10^{-2} cm/sec. During the 1988 geotechnical exploration work, a total of five groundwater monitoring wells, M-1S through M-5S, were installed in this aquifer. The details of these monitoring wells are provided in Appendix B. As shown in these details, the depths of these monitoring wells vary from 11.5 feet to 19.5 feet. The groundwater levels are measured, and samples are collected at regular intervals (quarterly) from these monitoring wells for chemical analyses. The results of these analyses are presented in Appendix E. Based on the measured water levels, a potentiometric surface map is prepared and is shown in Exhibit 12. As shown in this exhibit, the groundwater flow in this aquifer is in a northwest direction.

- Aquiclude

The aquiclude was encountered in all the borings drilled at the site during our exploration work and lies between the upper and lower aquifers. The aquiclude consists of stiff to hard, gray, silty clay. The thickness, in general, varies from 12.0 feet to 34.7 feet. However, at M-5 location, the thickness of this aquiclude is 9.0 feet. It should be noted that this area is at the northwest corner of the landfill site in the vicinity of the intersection of north and west drainage ditches. The elevation of the top of this aquiclude varies from 620.31 feet to 611.55 feet, and the bottom elevation of the aquiclude varies from 607.95 feet to 581.57 feet. The laboratory tests, including the permeability and CEC tests on the representative soil samples of this aquiclude, are described in detail in the preceding paragraphs of this section under the heading, "Silty Clay."

As described in those paragraphs, the k values vary from 3.6 x 10^{-8} cm/sec to 1.6 x 10^{-8} cm/sec and average 2.3 x 10^{-8} cm/sec with an exception of a value, 1.6 x 10^{-6} cm/sec. The relatively high k value of this sample is due to more silt content (CL-ML).

The CEC values vary from 4.35 meq per 100 gm to 5.64 meq per 100 gm and average 5.2 meq per 100 gm.

- Lower Aquifer

The lower aquifer is overlain by the aquiclude at elevations ranging from 607.95 feet to 581.57 feet. The depth to top of this aquifer, below the existing ground surface, varies from 20.5 feet to 49.0 feet. The lower aquifer is confined and consists of medium dense to dense, fine to coarse sand. Based on the grain size analysis and empirical relationships, the k values for this aquifer vary from 0.7×10^{-2} cm/sec to 5.7×10^{-2} cm/sec.

A total of five groundwater monitoring wells, M-1 through M-5, were installed in this aquifer. The wells M-1 through M-5 were installed in 1986 and the M-5 was added in 1988. The hydrograph of these wells is shown in Exhibit 13, and the potentiometric surface map for this aquifer is shown in Exhibit 14.

Based on the potentiometric surface map, it appears that the direction of groundwater flow, in this aquifer, is towards north. The drainage divide between the Mississippi and St Lawrence Basins crosses Lake County from east to west in a crooked line that passes to the south of Crown Point. The northern slope of the divide drains into the Calumet River and its branches, and the southern slope into the Kankakee River system. The Little Calumet River is the primary drainage channel for the Lake Michigan regional watershed (Reference: Soil Survey of Lake County, Indiana U.S.D.A. SCS, 1972).

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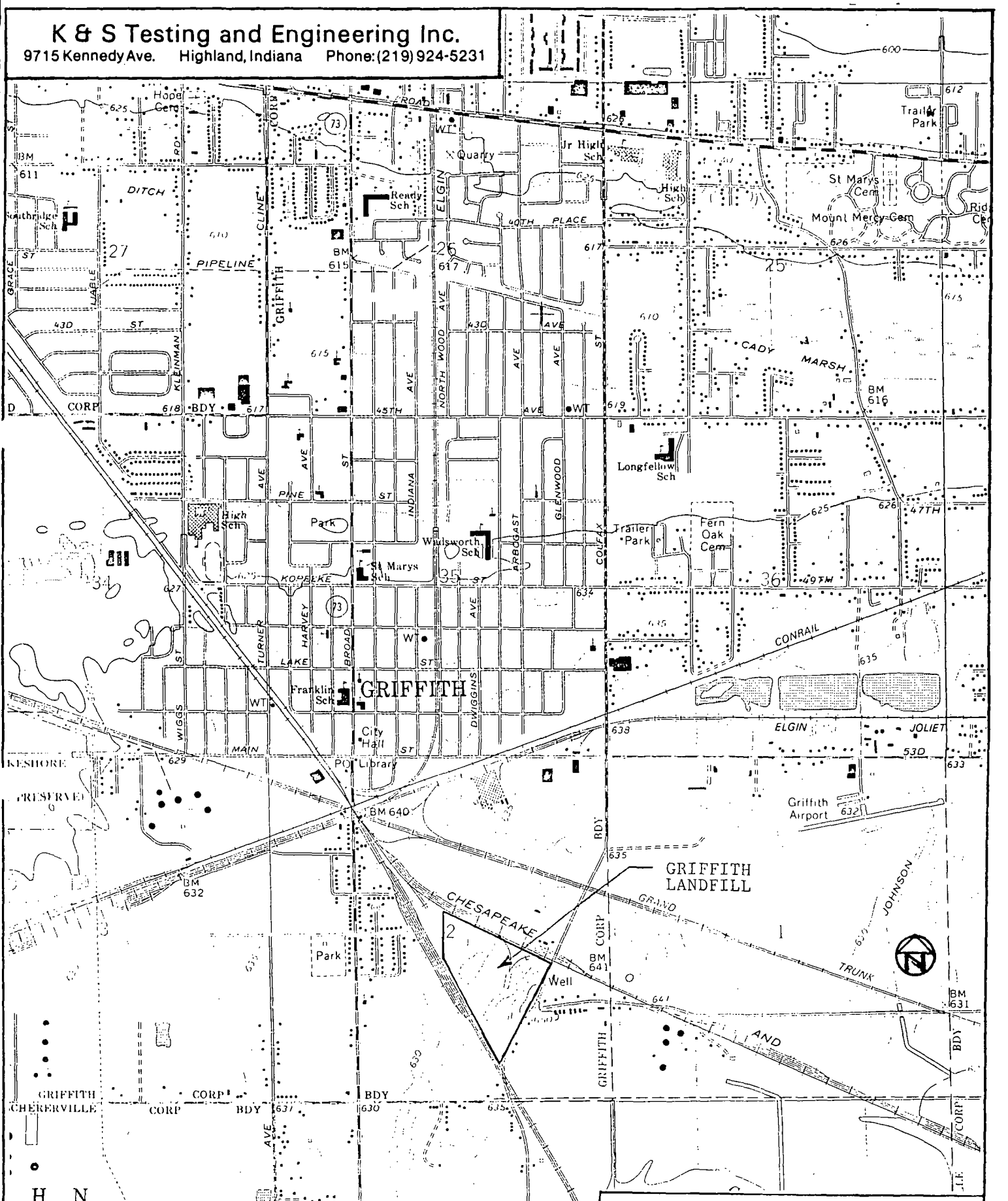


EXHIBIT 1

REGIONAL SITE AND SURFACE TOPOGRAPHY

Griffith Sanitary Landfill
Griffith, Indiana

FILE 220 DATE 5/3/86

TOPOGRAPHICAL PLOT PLAN
GRIFFITH, INDIANA

PHASE #	AREA IN ACRES	MAXIMUM DEPTH OF EXCAVATION
V	13.8	612.50
VI	14.2	612.50
VII	10.7	612.00
VIII	18.2	614.0 - 613.25
IX	18.2	613.25 - 612.50
X	17.8	612.50

EXHIBIT 2

GRIFFITH SANITARY LANDFILL SITE

Griffith, Indiana

PLAT OF SURVEY

MONITORING WELL OR SOIL BORING #		TOP OF P.V.C.	GROUND ELEV. @ WELL	N. COORDINATES	E. COORDINATES
(R) Monitoring Well	MW-3	634.89	632.79	248,849	482,886
(R) Boring	SB-4	634.00	632.79	248,087	487,330
(R) Monitoring Well	MW-2	632.74	630.80	250,880	490,908
(R) Boring	SB-2	632.06	630.87	249,708	489,308
(R) Monitoring Well	MW-1	627.47	624.86	1,249,148	478,082
(R) Boring	SB-1	627.77	624.86	834,368	478,867
(R) Monitoring Well	MW-4	634.86	627.81	1,064,807	487,888
(R) Boring	SB-4	634.05	627.73	1,065,874	488,002
(R) Monitoring Well	MW-5	629.71	626.80	899,471	487,888
(R) Boring	SB-5	629.65	626.46	1,041,273	486,444
(R) Soil Boring	SB-6		628.53	897,908	484,988
(R) Soil Boring	SB-7		633.08	892,894	482,780
(R) Soil Boring	SB-8		632.81	908,885	488,980
(R) Soil Boring	SB-9		622.36	877,486	481,084
(R) Soil Boring	SB-10		626.96	871,804	480,870

Note: The S.W. Corner of the N.W. 1/4 of the S.E. 1/4 of Section 2-35-9 is assumed as coordinate 0 N, 0 E.

PARCEL 1 - DESCRIPTION: Being a parcel of land lying in the East Half of Section 2, Township 35 North, Range 9 West of the Second Principal Meridian described as follows: Beginning at a point on the East line of the Northwest Quarter of the Southeast Quarter of said Section 2, which point lies 805.07 feet North of the South line of the Northwest Quarter of the southeast Quarter of said Section 2; thence North 89° 20' West, along a line parallel to the aforesaid South line, a distance of 174.61 feet; thence North 22° 29' East, along a line parallel to and 165.0 feet Northwest of (measured at right angles) the centerline of Colfax Avenue, a distance of 757.54 feet to a point of curve; thence Northeasterly on a curve concave to the Southeast and having a radius of 478.34 feet, the tangent of which makes an angle of 134° 15' 38" from Southwest to Northeast, a distance of 94.87 feet to a point on the Southwesterly right-of-way line of the Chesapeake and Ohio Railroad; thence South 64° 49' 30" East, along said Southwesterly right-of-way line, a distance of 330.0 feet to a point on the centerline of Colfax Avenue; thence South 22° 29' West, along said centerline, a distance of 644.15 feet to a point lying 105 feet North of and measured at right angles to the South line of the North Half of the Southeast Quarter of said Section 2; thence North 89° 20' West, parallel with said South line, a distance of 311.40 feet to the point of beginning, containing 6.00 acres more or less, all in the Town of Griffith, Lake County, Indiana.

PARCEL 2 - DESCRIPTION: Being a parcel of land lying in Section 2, Township 35 North, Range 9 West of the Second Principal Meridian, described as follows: Commencing at the Southeast corner of the Northwest Quarter of the Southeast Quarter of said Section 2; thence North 0° 05' West, along the East line of the Northwest Quarter of the Southeast Quarter of said Section 2, a distance of 305.32 feet; thence North 89° 20' West, along a line parallel to and 105 feet North of (measured at right angles) the South line of the Northwest Quarter of the Southeast Quarter of said Section 2, a distance of 174.61 feet to the point of beginning; thence continuing North 89° 20' West, a distance of 528.18 feet to a point that lies 705.11 feet North of the East line of the Northeast Quarter of the Southeast Quarter of said Section 2; thence South 0° 05' West, parallel to said East line, a distance of 700.01 feet; thence North 89° 20' West, along a line parallel to the South line of the Northeast Quarter of the Southeast Quarter of said Section 2, a distance of 184.81 feet to a point on the Northeasterly right-of-way line of the Chicago & Erie Railroad; thence North 29° 03' 32.5" West, along said Northeasterly right-of-way line, a distance of 934.81 feet to its intersection with the West line of the Northeast Quarter of the Southeast Quarter of said Section 2; thence North, along said West line, a distance of 105.14 feet to the Northwest corner of the Southeast Quarter of said Section 2; thence North 89° 11' 43.5" East, along the North line of the Southeast Quarter of said Section 2, a distance of 1660.08 feet to its intersection with the Northeasterly right-of-way line of the Chicago & Erie Railroad; thence North 29° 03' 32.5" West, along said Railroad right-of-way line, a distance of 329.35 feet to a point on the North line of the South Half of the Southeast Quarter of the Northeast Quarter of said Section 2; thence South 89° 11' 32.5" East, a distance of 351.11 feet to its intersection with the West line of the Northeast Quarter of said Section 2; thence North along the West line of the Northeast Quarter, a distance of 85.58 feet to a point lying on the Southwesterly right-of-way line of the Chesapeake & Ohio Railroad; thence Southeasterly along said R.R. right-of-way line on a curve concave to the Northeast and having a radius of 1482.40 feet, the tangent of which makes an angle of 64° 25' 32" from South to East with the last described line, a distance of 101.71 feet; thence South 64° 49' 30" East, along said railroad right-of-way line, a distance of 944.60 feet to a point of curve which is 858 feet Northeasterly of the centerline of Colfax Avenue, as measured along aforesaid Southeasterly railroad right-of-way line; thence Southeasterly along a curve concave to the Southwest and having a radius of 478.34 feet, the tangent of which makes an angle of 134° 36' 42" from Northeast to Southeast, a distance of 539.14 feet; thence South 35° 10' 10" West, a distance of 220.0 feet; thence South 64° 49' 50" East, a distance of 30.0 feet; thence North 35° 10' 10" East, a distance of 220.0 feet to a point of curve; thence Northeasterly on a curve concave to the Southeast and having a radius of 478.34 feet, a distance of 444.27 feet; to a point, which lies 165 feet Northwest measured at right angles to the centerline of Colfax Avenue; thence South 22° 29' East, along a line parallel to the centerline of Colfax Avenue, a distance of 757.54 feet to the point of beginning, containing 11.377 acres more or less, all in the Town of Griffith, Lake County, Indiana.

SUBJECT PROPERTY LIES IN FLOOD ZONE C, AN AREA OF MINIMAL FLOODING
THE PREVAILING WIND DIRECTION IS FROM THE NORTHWEST

STATE OF INDIANA)
COUNTY OF LAKE) SS

This is to certify that I have surveyed the above described property according to the Official Records and that the Plat hereon drawn correctly represents said survey.

SOUTHWICK ENGINEERING, INC.

Gary P. Borreson - Registered Professional Engineer #10976 & Land Surveyor #5054

LEGEND
- SOIL BORING DRILLED IN 1974
- SOIL BORING DRILLED IN 1988
- SOIL BORING DRILLED IN 1988
- MONITORING WELLS (8 in.) P.V.C. INSTALLED IN 1986
- MONITORING WELLS (6in.) P.V.C. INSTALLED IN 1988

EXHIBIT 3

SOIL BORING AND GROUNDWATER MONITORING WELL LOCATIONS

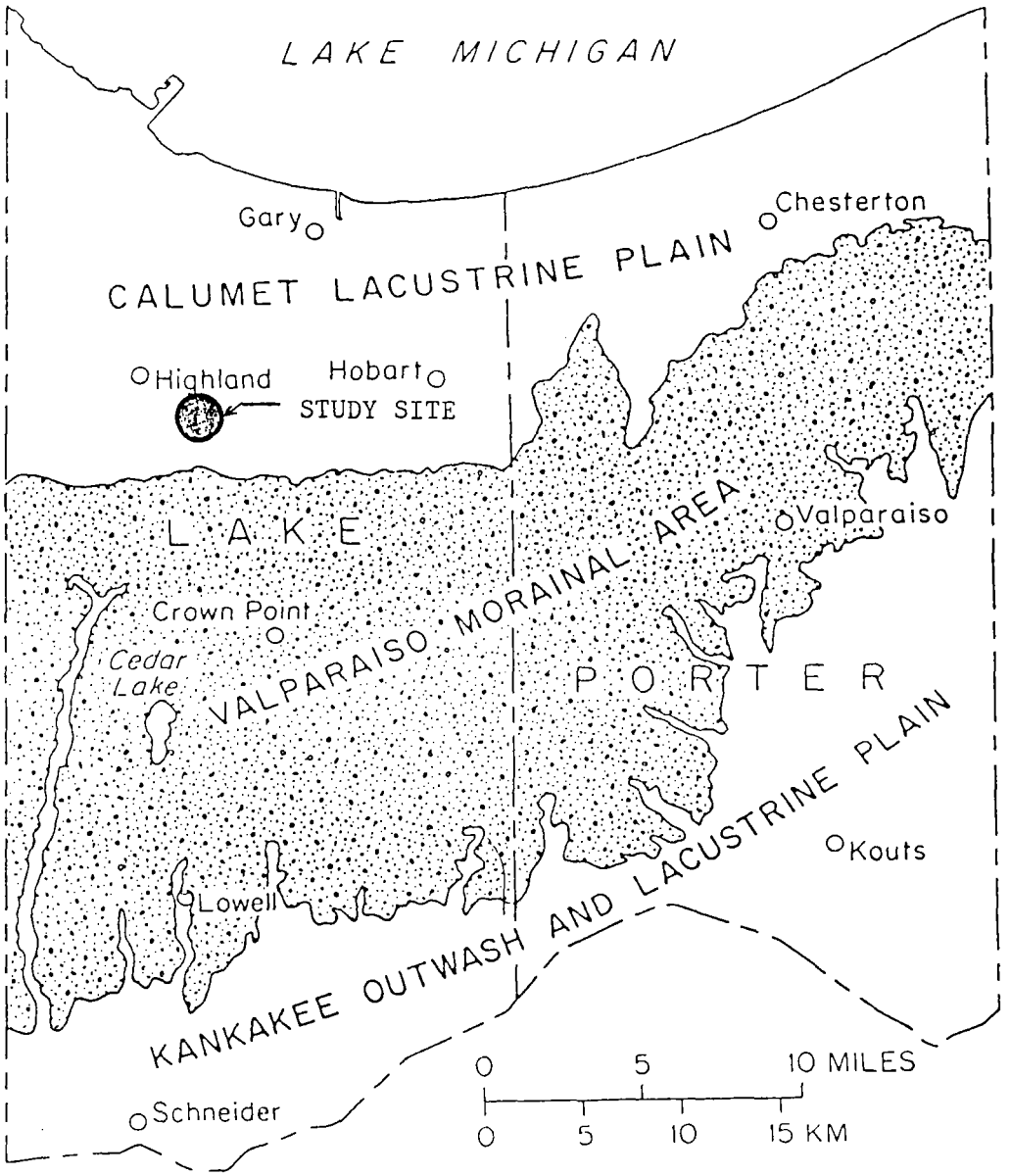
Griffith Sanitary Landfill
Griffith, Indiana

SOUTHWICK ENGINEERING, INC.
Engineers & Surveyors
Ridge Road
Munster, Indiana 46321

2

8

K & S Testing and Engineering Inc.
9715 Kennedy Ave. Highland, Indiana Phone: (219) 924-5231



REFERENCE:

Environmental Geology of
Lake and Porter Counties, Indiana
Special Report 11.

EXHIBIT 4

PHYSIOGRAPHIC UNITS

Griffith Sanitary Landfill
Griffith, Indiana

FILE 220 DATE 5/3/86

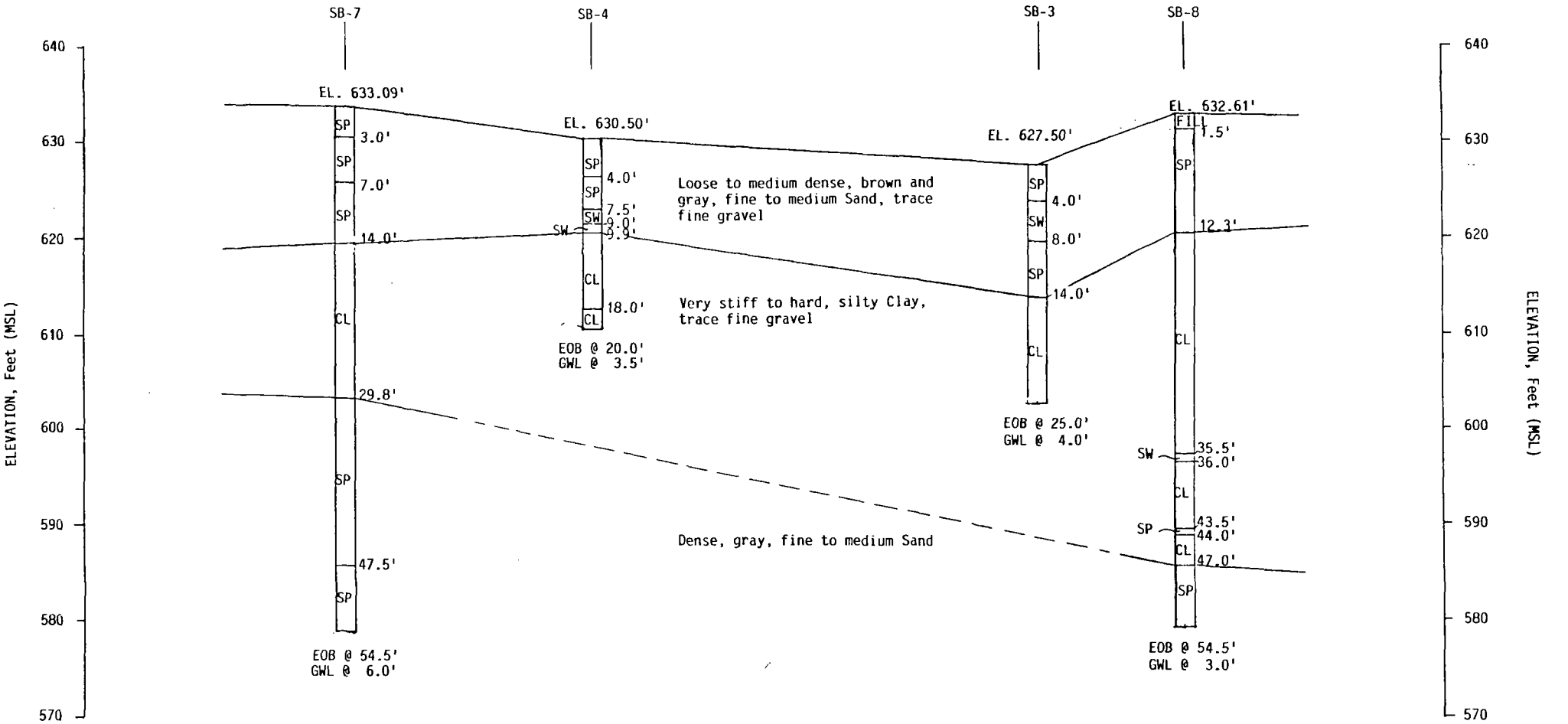


EXHIBIT 5

GENERALIZED SUBSURFACE SOIL PROFILE
SECTION A-A

Griffith Sanitary Landfill
Griffith, Indiana

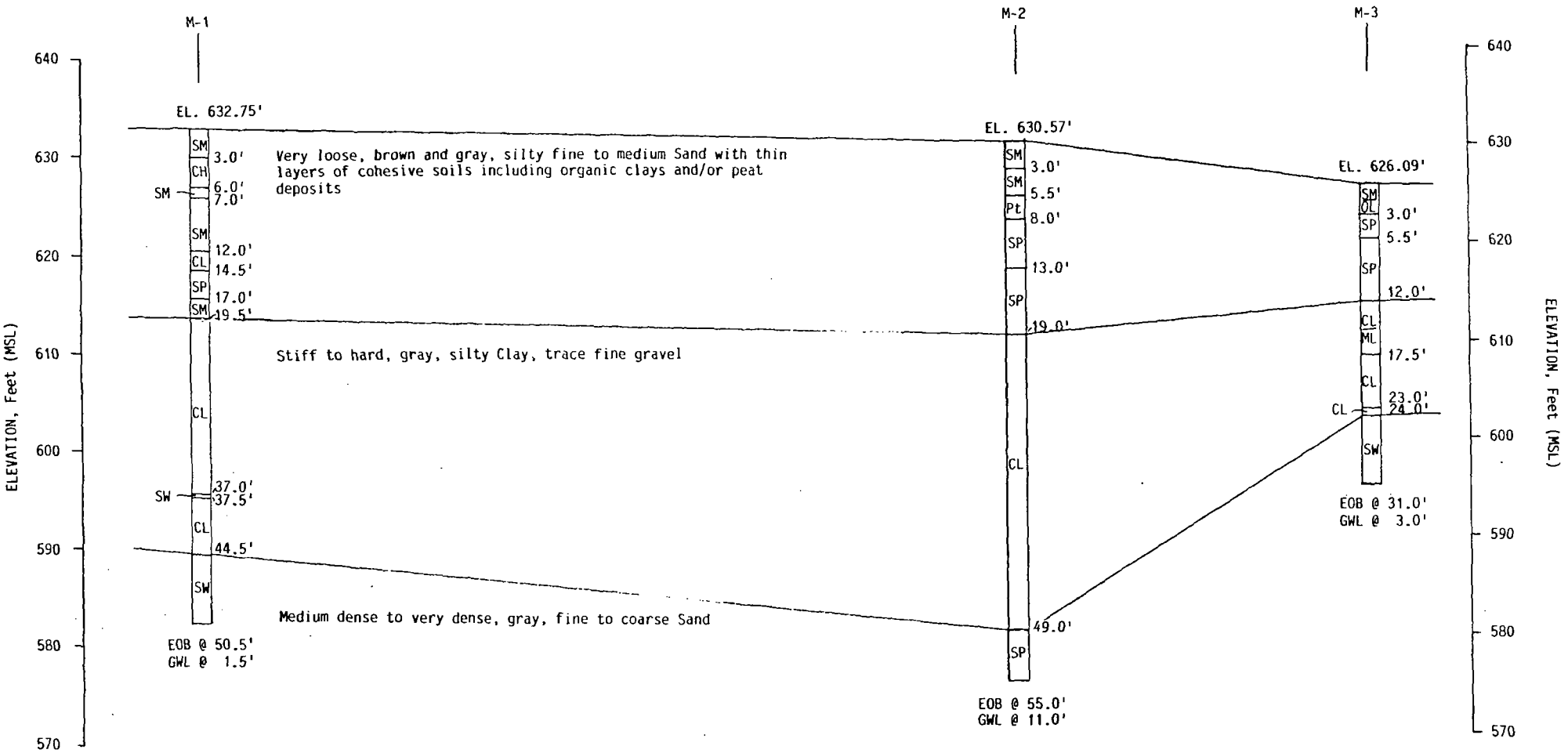


EXHIBIT 6

GENERALIZED SUBSURFACE SOIL PROFILE
SECTION B-B

Griffith Sanitary Landfill
Griffith, Indiana

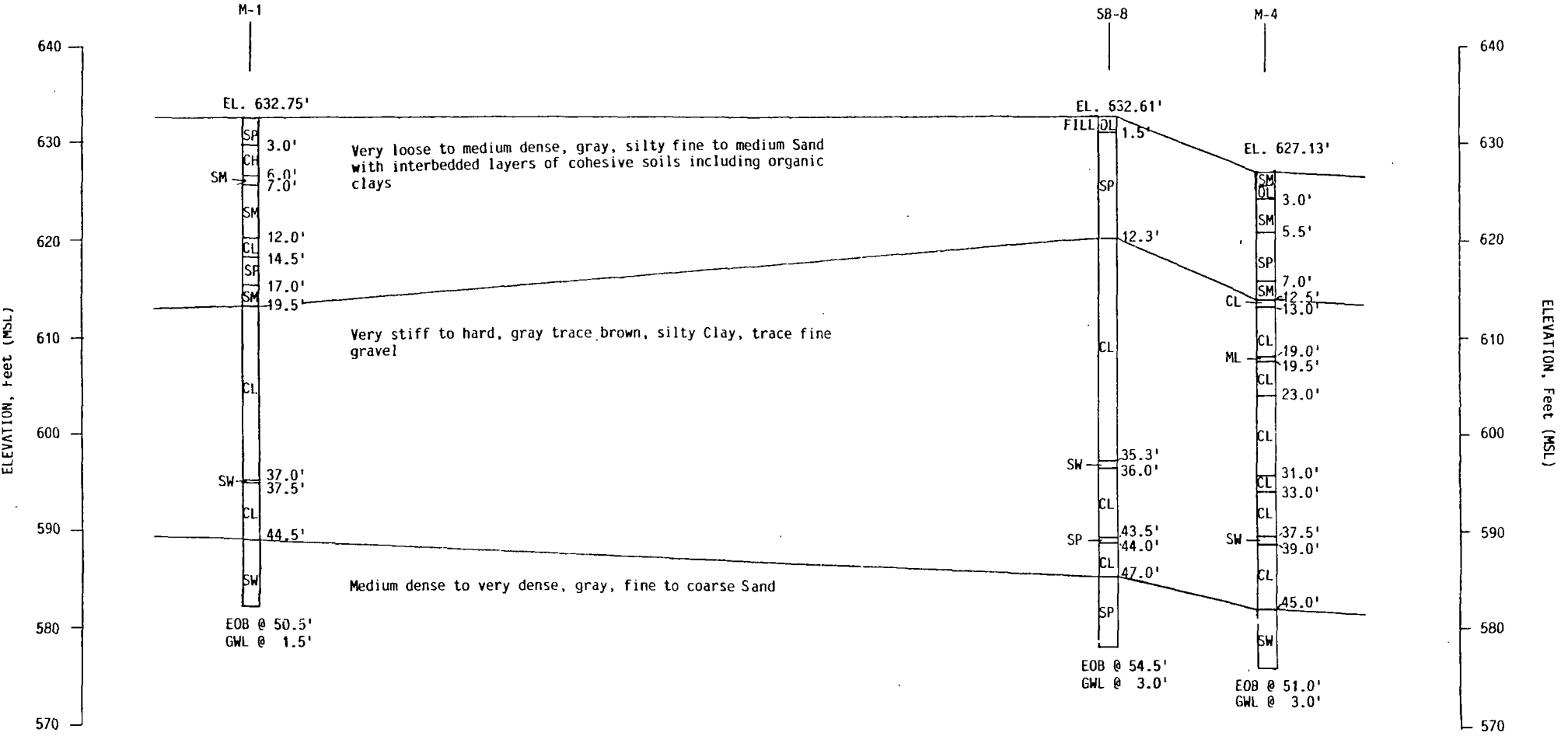


EXHIBIT 7

GENERALIZED SUBSURFACE SOIL PROFILE
SECTION C-C

Griffith Sanitary Landfill
Griffith, Indiana

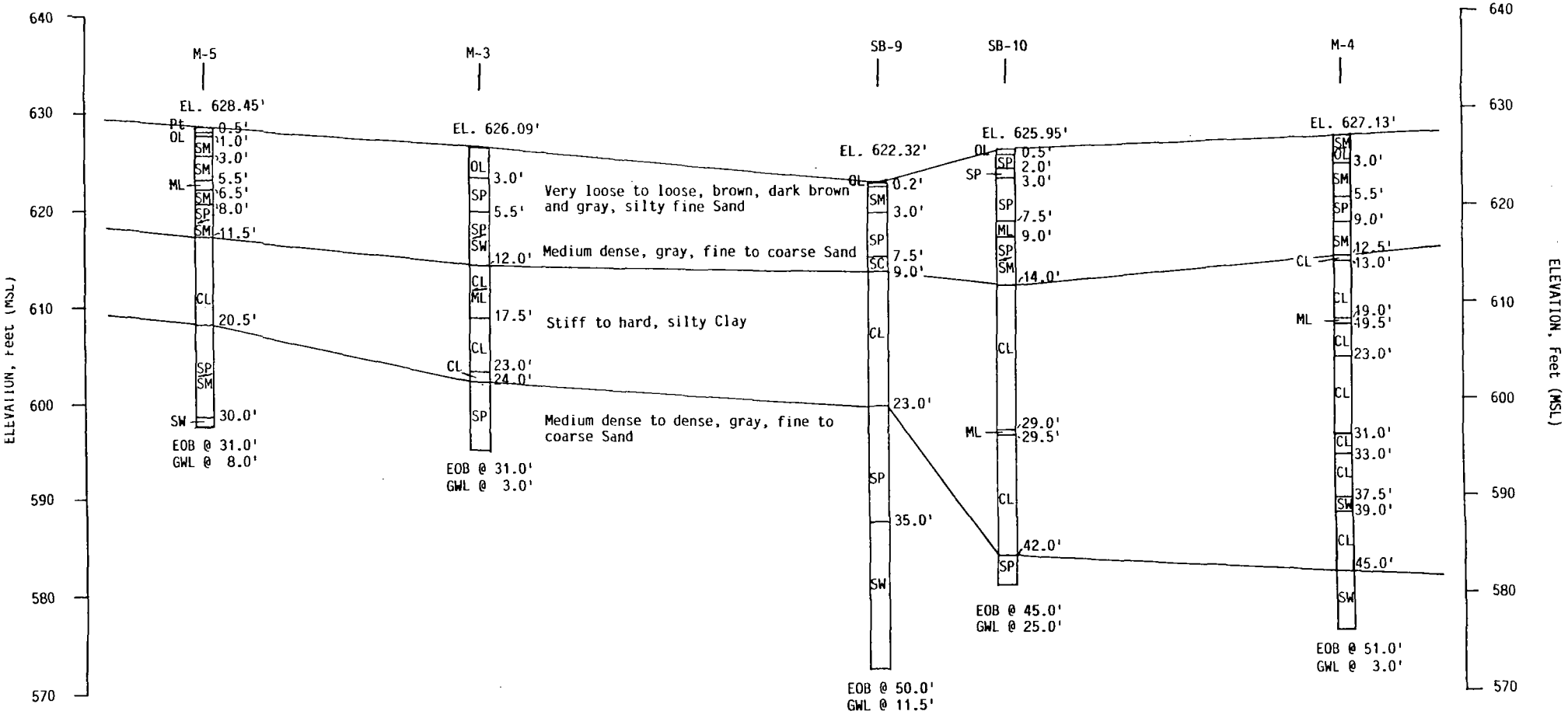
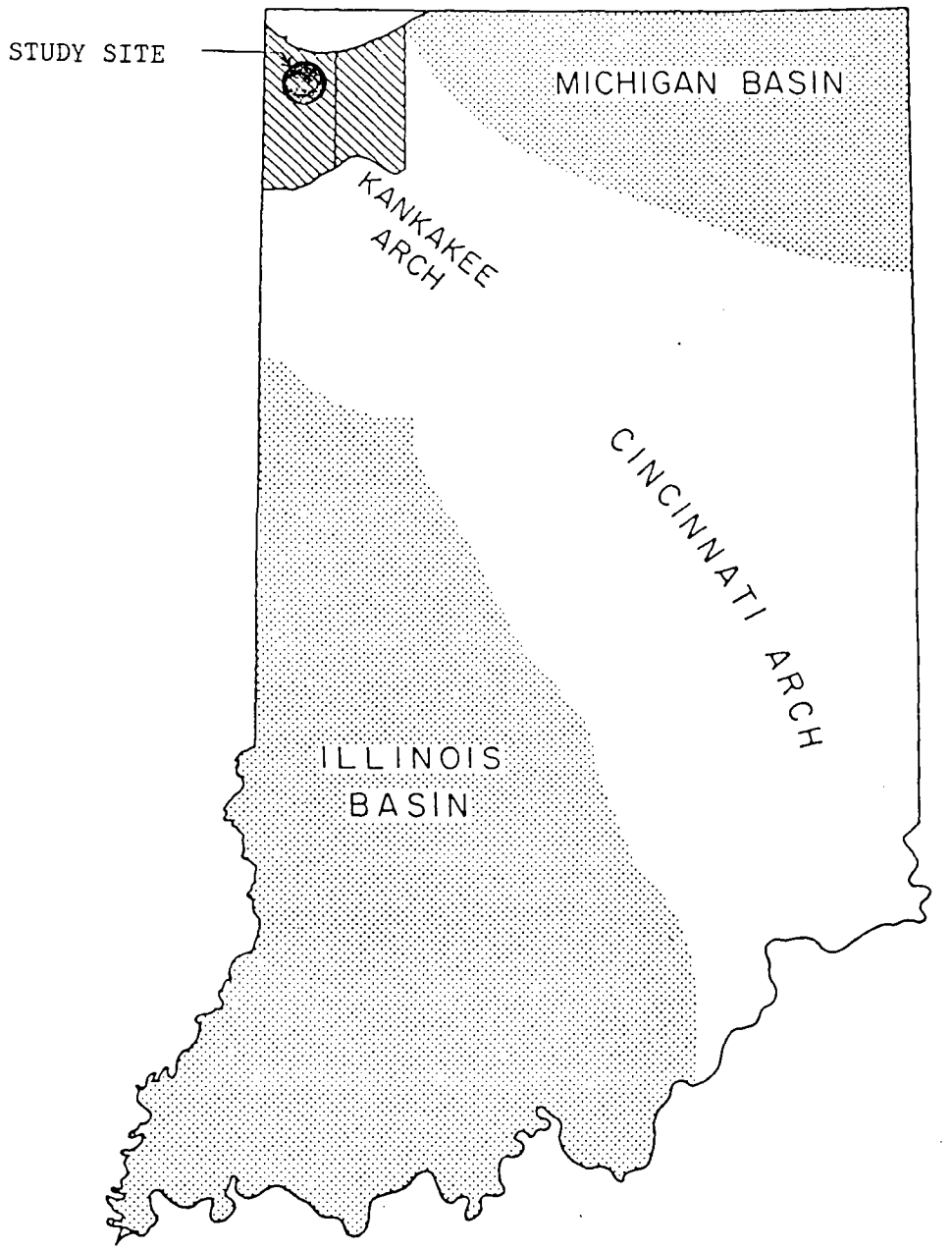


EXHIBIT 8

GENERALIZED SUBSURFACE SOIL PROFILE
SECTION D-D

Griffith Sanitary Landfill
Griffith, Indiana

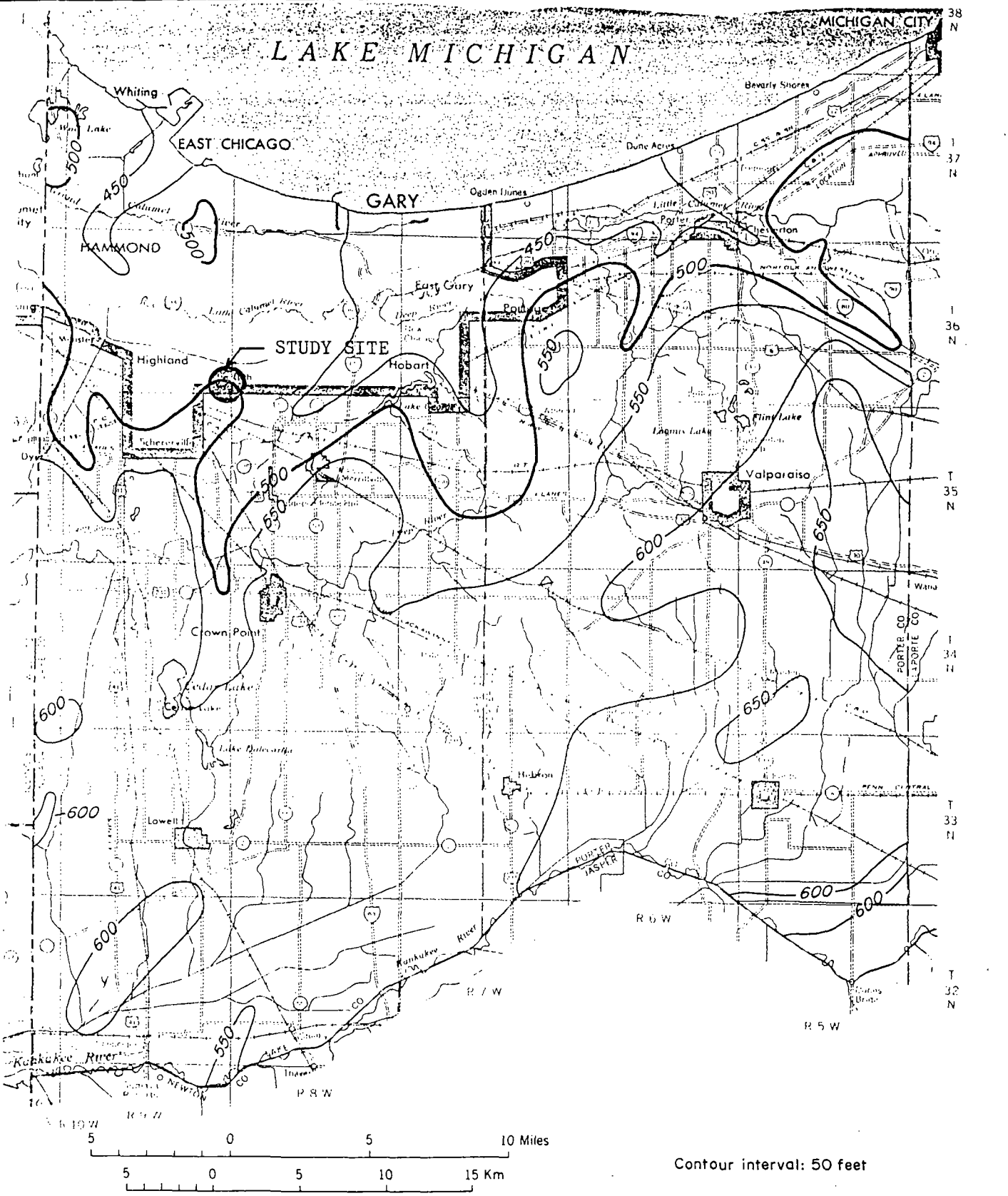
K & S Testing and Engineering Inc.
9715 Kennedy Ave. Highland, Indiana Phone: (219) 924-5231



REFERENCE:
Environmental Geology of
Lake and Porter Counties, Indiana
Special Report 11.

EXHIBIT 9
MAJOR BEDROCK STRUCTURAL FEATURES
Griffith Sanitary Landfill
Griffith, Indiana
FILE 220 DATE 5/3/86

K & S Testing and Engineering Inc.
9715 Kennedy Ave. Highland, Indiana Phone: (219) 924-5231



Contour interval: 50 feet

REFERENCE:

Environmental Geology of
Lake and Porter Counties, Indiana
Special Report 11.

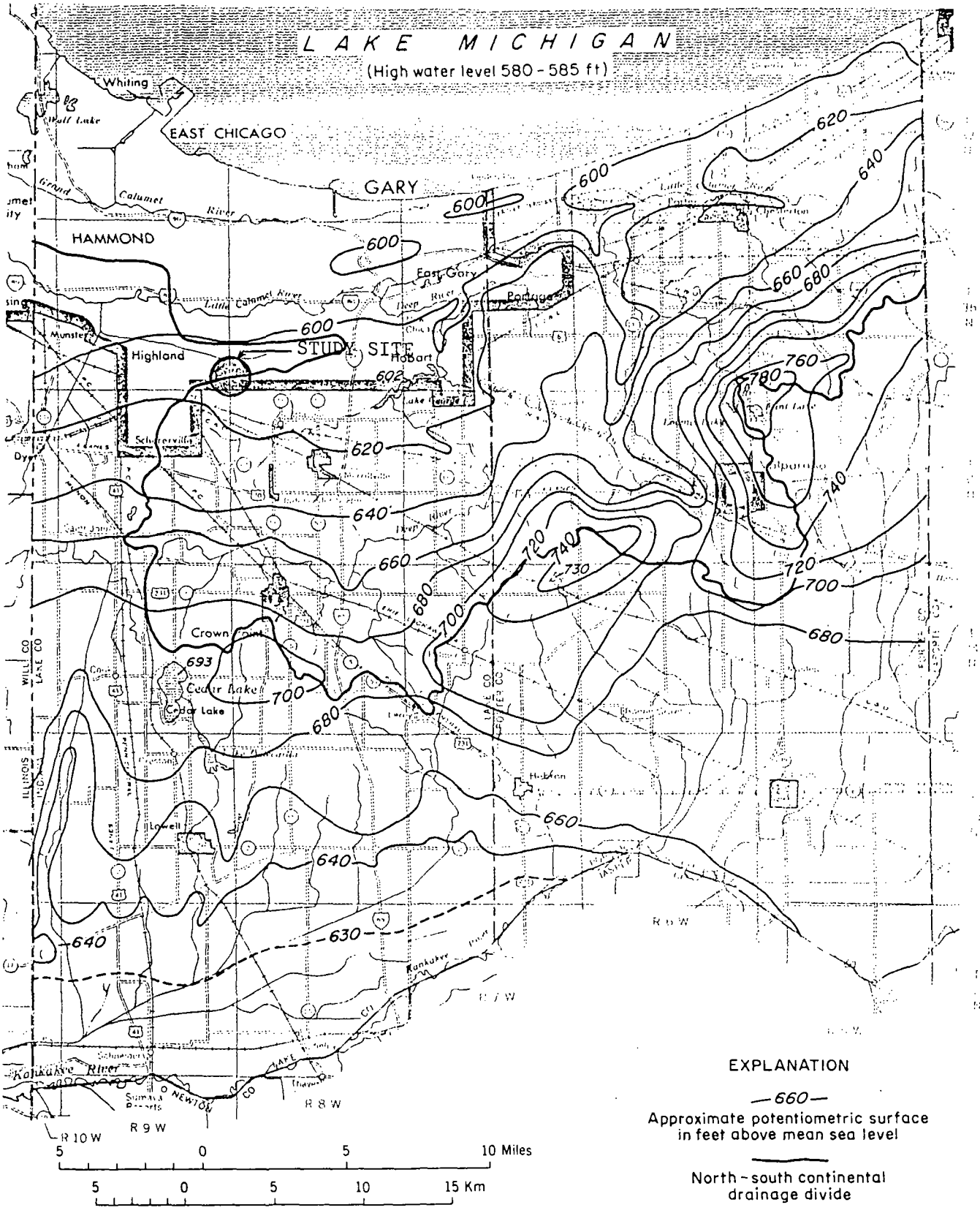
EXHIBIT 10

REGIONAL ROCK SURFACE CONTOUR MAP

Griffith Sanitary Landfill
Griffith, Indiana

FILE 220 DATE 5/3/86

K & S Testing and Engineering Inc.
9715 Kennedy Ave. Highland, Indiana Phone: (219) 924-5231



EXPLANATION

—660— Approximate potentiometric surface in feet above mean sea level

North - south continental drainage divide

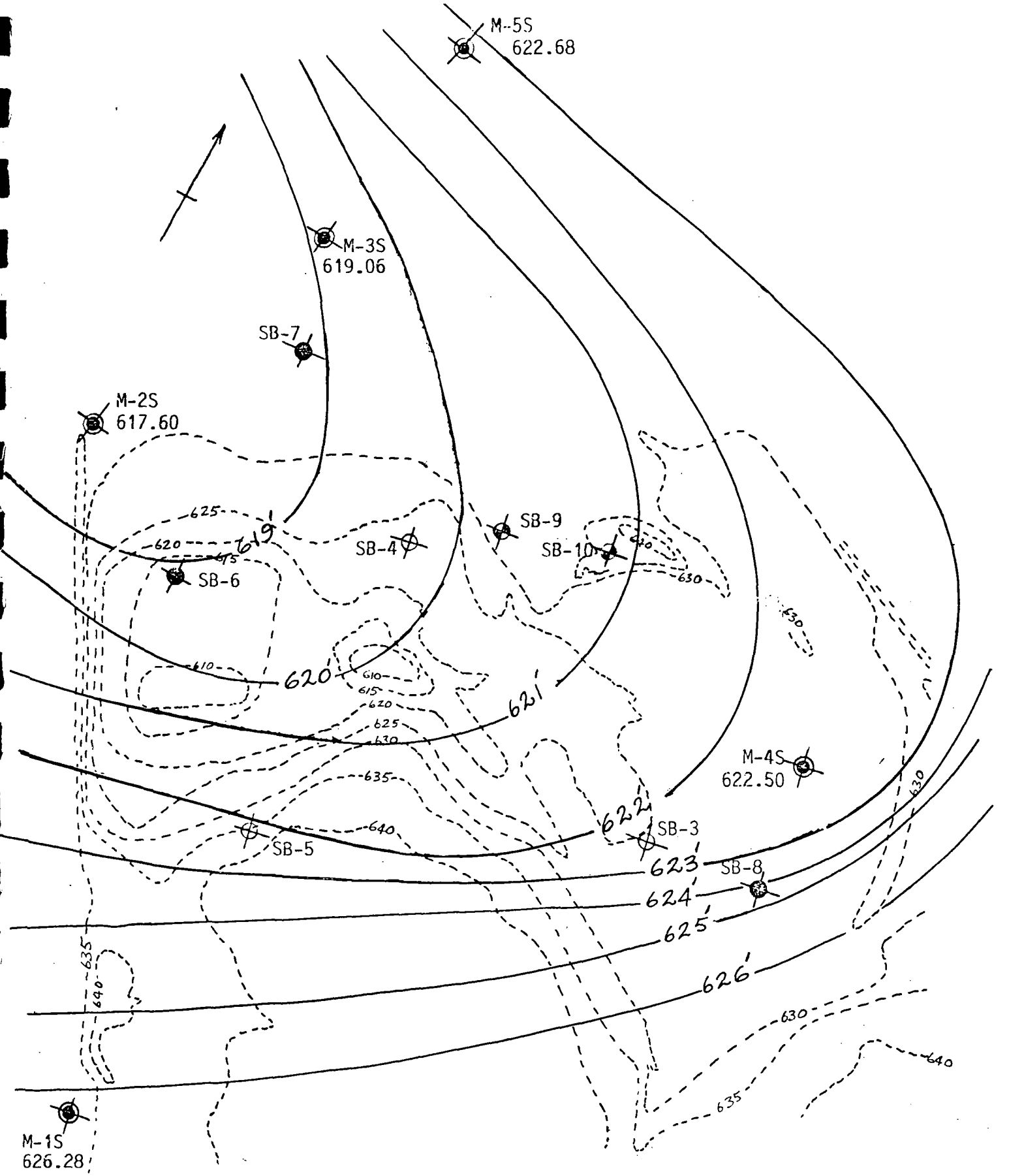
Reference:
Environmental Geology of
Lake and Porter Counties, Indiana
Special Report 11.

EXHIBIT 11

REGIONAL POTENTIOMETRIC SURFACE MAP

Griffith Sanitary Landfill
Griffith, Indiana

FILE 220 DATE 5/3/86



NOTES:

1. Potentiometric surface map shown was prepared based on limited available data; therefore, is approximate.
2. The elevations shown correspond to data obtained on October 24, 1988.
3. Contours shown in dotted lines represent topography of the area.

EXHIBIT 12

POTENTIOMETRIC SURFACE MAP FOR THE UPPER AQUIFER

Griffith Sanitary Landfill
Griffith, Indiana

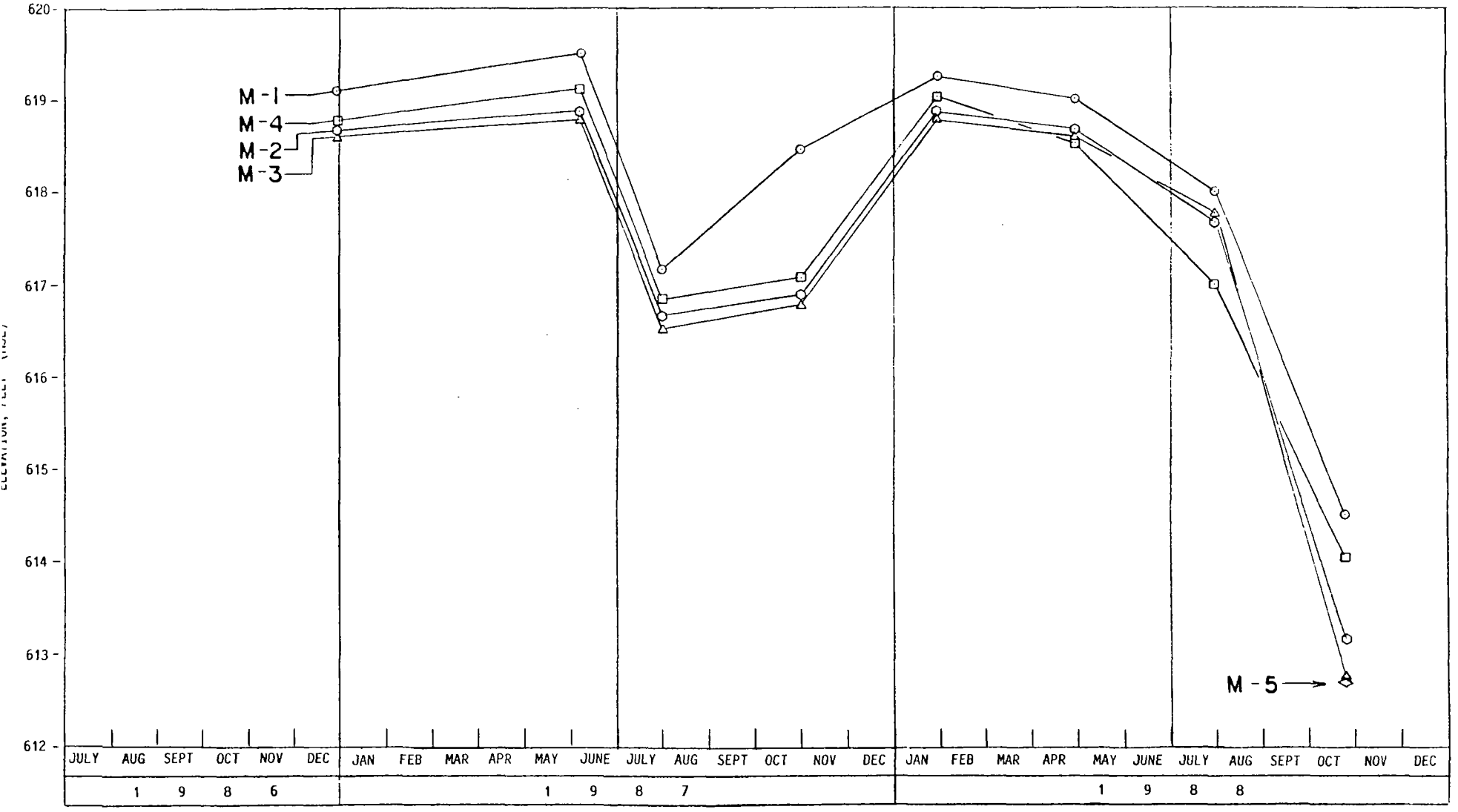


EXHIBIT 13

HYDROGRAPHS FOR MONITORING WELLS
M-1 THROUGH M-4

Griffith Sanitary Landfill
Griffith, Indiana

NOTES:

1. Potentiometric surface map shown was prepared based on limited available data; therefore, is approximate.
2. The elevations shown correspond t data obtained on October 24, 1988.
3. Contours shown in dotted lines represent topography of the area.

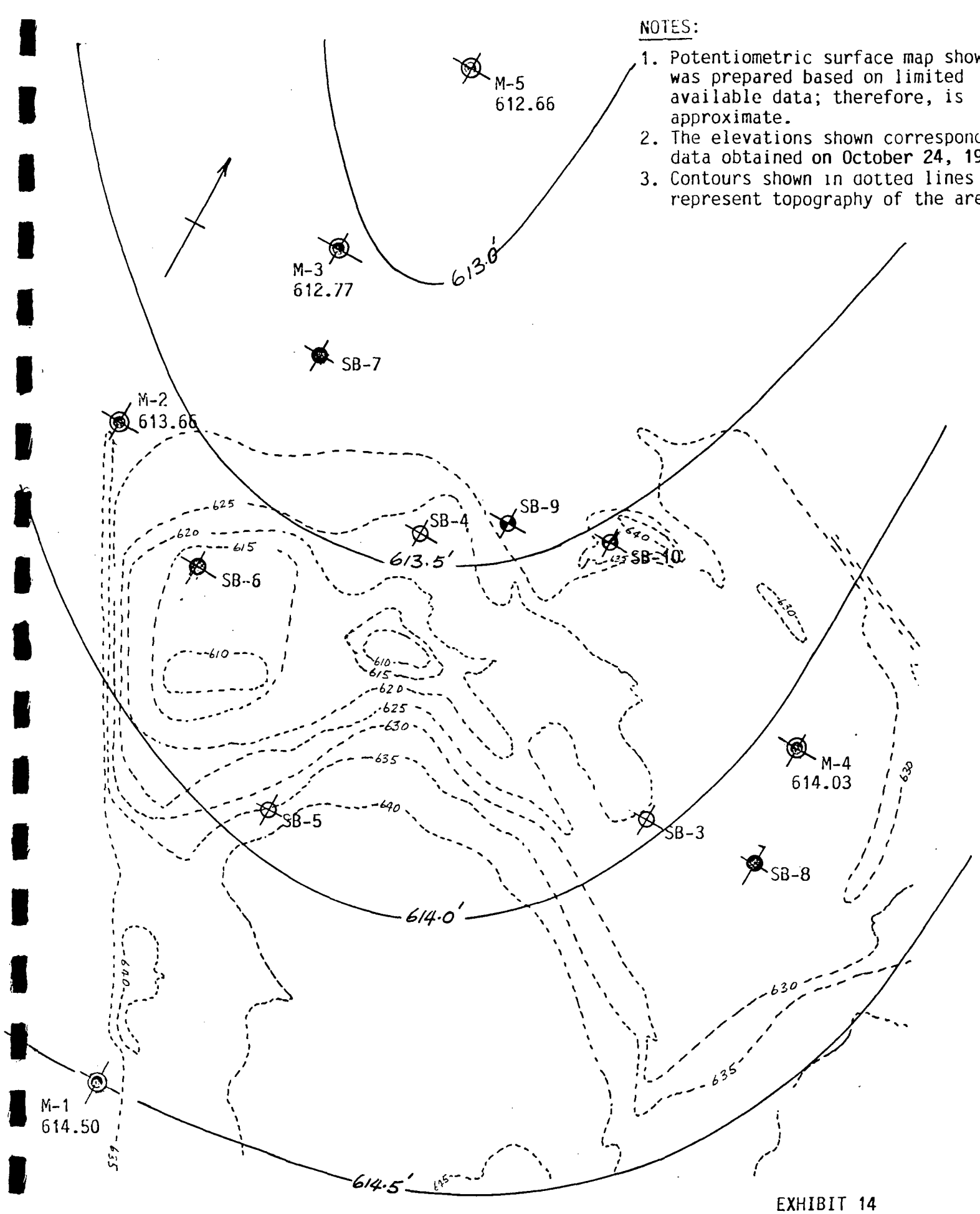


EXHIBIT 14

POTENTIOMETRIC SURFACE MAP
FOR THE LOWER AQUIFER

Griffith Sanitary Landfill

APPENDIX A
SOIL BORING LOGS

CLIENT: Torrenga Engineering	LOG OF BORING NUMBER: SB-6
SITE LOCATION: Colfax Avenue, Griffith, Indiana	PROJECT NAME: Griffith Sanitary Landfill
BORING STARTED: 01-29-86 / RIG: CME-55	FILE NUMBER: 220
BORING COMPLETED: 01-29-86 / FOREMAN: D. Koditek	
SURFACE ELEVATION: 611.55'	

CALIBRATED PENETROMETER, TONS/FT.²
UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²
WATER CONTENT PERCENT
STANDARD PENETRATION, BLOWS/FT.

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Very stiff gray silty clay.	2.5			1
					2
		5.0			3
					4
		7.5			5
		10.0			6
12.0					7
12.3	Coarse gray sand.	12.5			8
13.1	Very stiff gray silty clay.				
14.0	Fine to coarse gray sand.				
	Very stiff gray silty clay.	15.0			9
16.0	Medium dense gray fine to coarse sand.				10
		17.5			
18.0	Very stiff gray silty clay.				11
		20.0			12
					13
		22.5			
24.3					14
25.0	Fine to coarse gray sand.	25.0			

Water Level

84

WATER LEVEL WHILE DRILLING 14.0 ft.

WATER LEVEL Artesian flow was noted after last sample was pulled out.

SPLIT SPOON | SHELBY TUBE | A AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT: Torrenga Engineering	LOG OF BORING NUMBER: SB-7 (sheet 1)
SITE LOCATION: Colfax Avenue, Griffith, Indiana	PROJECT NAME: Griffith Sanitary Landfill
BORING STARTED: 01-30-86 / RIG: CME-55	FILE NUMBER: 220
BORING COMPLETED: 01-31-86 / FOREMAN: D. Koditek	
SURFACE ELEVATION: 633.09′	

CALIBRATED PENETROMETER, TONS/FT.²
UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²
1 2 3 4 5
WATER CONTENT PERCENT
10 20 30 40 50
STANDARD PENETRATION, BLOWS/FT.
10 20 30 40 50

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Medium dense dark brown fine to medium sand.	2.5			1, 2
3.0	Medium dense brown fine to medium sand.	5.0			3, 4
7.0	Medium dense gray fine to medium sand.	7.5, 10.0, 12.5			5, 6, 7, 8
14.0	Very stiff & hard gray silty clay.	15.0, 17.5, 20.0, 22.5			9, 10, 11, 12, 13, 14, 15

Water Level

WATER LEVEL WHILE DRILLING 6.0 ft.
WATER LEVEL

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE
+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT
Torrenga Engineering

LOG OF BORING NUMBER
SB-7 (sheet 2)

SITE LOCATION
Colfax Avenue, Griffith, Indiana

PROJECT NAME
Griffith Sanitary Landfill

BORING STARTED 01-30-86
BORING COMPLETED 01-31-86
RIG CME -55
FOREMAN D. Koditek
FILE NUMBER 220

SURFACE ELEVATION 633.09'

CALIBRATED PENETROMETER, TONS/FT.²
UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²
1 2 3 4 5
WATER CONTENT PERCENT
10 20 30 40 50
STANDARD PENETRATION, BLOWS/FT.
10 20 30 40 50

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Very stiff hard gray silty clay.	27.5			15, 16, 17
29.8		30.0			18
	Dense gray fine to medium sand.	32.5			19
		35.0			20, 21
		37.5			22
		40.0			23, 24
		42.5			25
		45.0			26, 27
47.5		47.5			28
	Very dense gray fine to medium sand.				29

52
64

WATER LEVEL WHILE DRILLING 6.0 ft.
WATER LEVEL

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE
+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT	LOG OF BORING NUMBER
Torrenga Engineering	SB-7 (sheet 3)
SITE LOCATION	**PROJECT NAME**
Colfax Avenue, Griffith, Indiana	Griffith Sanitary Landfill
BORING STARTED 01-30-86 / RIG CME-55	FILE NUMBER 220
BORING COMPLETED 01-31-86 / FOREMAN D. Koditek	

SURFACE ELEVATION 633.09'

CALIBRATED PENETROMETER, TONS/FT.²
UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²
WATER CONTENT PERCENT
STANDARD PENETRATION, BLOWS/FT.

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER	STANDARD PENETRATION, BLOWS/FT.
	Very dense gray fine to medium sand.	52.5			29	102
					30	80
					31	54
54.5	END OF BORING					

WATER LEVEL WHILE DRILLING 6.0 ft.

WATER LEVEL

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

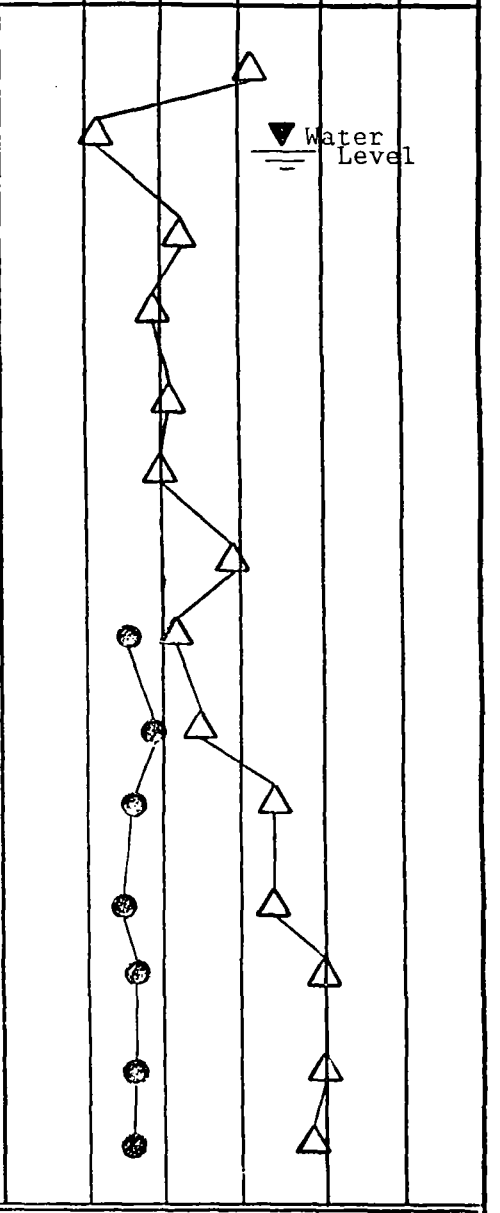
K & S TESTING AND ENGINEERING INC.
9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT	LOG OF BORING NUMBER
Torrenga Engineering	SB-8 (sheet 1)
SITE LOCATION	**PROJECT NAME**
Colfax Avenue, Griffith, Indiana	Griffith Sanitary Landfill

BORING STARTED	01-31-86	RIG	CME-55	FILE NUMBER
BORING COMPLETED	02-03-86	FOREMAN	D. Koditek	220

SURFACE ELEVATION 632.61'

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
1.5	Mixed black & brown sand fill.	2.5			1
	Medium dense gray fine to medium sand.	5.0			2
		7.5			3
		10.0			4
		12.5			5
12.3	Very stiff to hard gray silty clay.	15.0			6
		17.5			7
		20.0			8
		22.5			9
					10
					11
					12
					13
					14
					15



WATER LEVEL WHILE DRILLING 3.0 ft.

WATER LEVEL

SPLIT SPOON | SHELBY TUBE | A AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.

9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322

TELEPHONE: (219) 924-5231

CLIENT	LOG OF BORING NUMBER
Torrenga Engineering	SB-8 (sheet 2)
SITE LOCATION	**PROJECT NAME**
Colfax Avenue, Griffith, Indiana	Griffith Sanitary Landfill
BORING STARTED 01-31-86 / RIG CME-55	FILE NUMBER 220
BORING COMPLETED 02-03-86 / FOREMAN D. Koditek	

SURFACE ELEVATION 632.61'

CALIBRATED PENETROMETER, TONS/FT.²
UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²
1 2 3 4 5
WATER CONTENT PERCENT
10 20 30 40 50
STANDARD PENETRATION, BLOWS/FT.
10 20 30 40 50

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Very stiff to hard gray silty clay.	27.5			15
					16
		30.0			17
					18
		32.5			19
					20
35.3		35.0			
36.0	Medium dense gray fine to coarse sand.				21
		37.5			22
	Very stiff gray silty clay.				23
		40.0			
					24
		42.5			25
43.5					
44.0	Medium dense fine to medium sand, wet				
		45.0			26
	Very stiff gray silty clay.				
47.0					27
		47.5			28
	Dense gray fine to medium sand, wet.				
					29

▼ WATER LEVEL WHILE DRILLING 3.0 ft.

▼ WATER LEVEL

SPLIT SPOON | SHELBY TUBE | A AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT Torrenga Engineering	LOG OF BORING NUMBER SB-8 (sheet 3)
SITE LOCATION Colfax Avenue, Griffith, Indiana	PROJECT NAME Griffith Sanitary Landfill
BORING STARTED 01-31-86 / RIG CME-55 BORING COMPLETED 02-03-86 / FOREMAN D. Koditek	FILE NUMBER 220

SURFACE ELEVATION 632.61'

CALIBRATED PENETROMETER, TONS/FT.²

UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²

WATER CONTENT PERCENT

STANDARD PENETRATION, BLOWS/FT.

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Dense gray fine to medium sand, wet.	52.5			29 30 31
54.5	END OF BORING				

69

WATER LEVEL WHILE DRILLING 3.0 ft.

WATER LEVEL

SPLIT SPOON SHELBY TUBE AUGER ROCK CORE

+PL - PLASTIC LIMIT +LL - LIQUID LIMIT γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT: Torrenga Engineering

LOG OF BORING NUMBER: SB-9

SITE LOCATION: Colfax Avenue, Griffith, Indiana

PROJECT NAME: Griffith Sanitary Landfill

BORING STARTED: 09-19-1988 | RIG: D-50

BORING COMPLETED: 09-21-1988 | FOREMAN: B. Kollasch

FILE NUMBER: 220

SURFACE ELEVATION: 622.32'

CALIBRATED PENETROMETER, TONS/FT.²

UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²

WATER CONTENT PERCENT

STANDARD PENETRATION, BLOWS/FT.

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
0.2	Brown, silty fine Sand.				
	Medium dense, gray, silty fine to coarse Sand, little clay, trace fine to coarse gravel	2.5			1
3.0	Medium dense, gray, fine to coarse Sand, trace fine gravel.	5.0			2
		7.5			3
7.5	Stiff, gray, fine sandy Clay, trace fine gravel and shale.				4
9.0	Very stiff, gray, silty Clay, trace fine gravel and shale.	10.0			4A
	— Grades to hard.	12.5			5
		15.0			6
	— Grades to very stiff with fine to coarse gravel.	17.5			7
	LL = 28.0 PL = 17.0 -#200 = 80.0				8
	— Grades with fine gravel.	20.0			9
	LL = 30.0 PL = 11.0 -#200 = 88.0	22.5			10
23.0	Medium dense, light gray, fine to coarse Sand, trace fine gravel and shale.				11
25.0		25.0			

WATER LEVEL WHILE DRILLING 2.0 feet

WATER LEVEL 11.5 feet 48 hours after completion

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT: Torrenga Engineering

LOG OF BORING NUMBER: SB-9

SITE LOCATION: Colfax Avenue, Griffith, Indiana

PROJECT NAME: Griffith Sanitary Landfill

BORING STARTED: 09-19-1988 | RIG: D-50

BORING COMPLETED: 09-21-1988 | FOREMAN: B. Kollasch

FILE NUMBER: 220

SURFACE ELEVATION: 622.32'

CALIBRATED PENETROMETER, TONS/FT.²

UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²

WATER CONTENT PERCENT

STANDARD PENETRATION, BLOWS/FT.

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER	STANDARD PENETRATION, BLOWS/FT.
	— Grades to very dense and brown sand.				12	71
		27.5			13	78
	— Grades to gray.	30.0			14	71
		32.5			15	73
	— Grades with a 1"± seam of clay at 35'±				16 16A	76
35.0	Very dense, gray, fine to coarse Sand, trace fine gravel and shale.	35.0			17	60
		37.5			18	
		40.0			19	67
		42.5			20	58
		45.0			21	59
	— Grades with a 1"± seam of light gray silty clay at 46'±				22	
		47.5			23	
	END OF BORING AT 50.0 feet	50.0				118

▼ WATER LEVEL WHILE DRILLING 2.0 feet

▼ WATER LEVEL 11.5 feet 48 hours after completion

SPLIT SPOON | SHELBY TUBE | A AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT: Torrenga Engineering

LOG OF BORING NUMBER: SB-10

SITE LOCATION: Colfax Avenue, Griffith, Indiana

PROJECT NAME: Griffith Sanitary Landfill

BORING STARTED: 09-22-1988 | RIG: D-50

BORING COMPLETED: 09-22-1988 | FOREMAN: B. Kollasch

FILE NUMBER: 220

SURFACE ELEVATION: 625.95'

CALIBRATED PENETROMETER, TONS/FT.²

UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²

WATER CONTENT PERCENT

STANDARD PENETRATION, BLOWS/FT.

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
0.5	Dark brown, silty fine Sand.				
2.0	Brown, fine Sand, trace silt.				
3.0	Medium dense, rusty brown, fine Sand, trace silt.	2.5			
	Medium dense, gray, fine to coarse Sand, trace silt, little shale.	5.0			1
7.5	Medium stiff, clayey Silt and fine sand.	7.5			
9.0	Medium dense, gray, silty fine to coarse Sand, trace fine gravel	10.0			2 2A
		12.5			
14.0	Very stiff, gray, silty Clay, trace fine gravel and shale.	15.0			3 4
	— Grades to hard.	17.5			5
	— Grades to very stiff.	20.0			6
	LL = 34.0 PL = 13.0 — Grades to hard. -#200 = 91.0	22.5			7
	— Grades to very stiff.	25.0			8

WATER LEVEL WHILE DRILLING 3.5 feet

WATER LEVEL 25.0 feet 24 hours after completion

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT: Torrenga Engineering

LOG OF BORING NUMBER: SB-10

SITE LOCATION: Colfax Avenue, Griffith, Indiana

PROJECT NAME: Griffith Sanitary Landfill

BORING STARTED: 09-22-1988 | RIG: D-50

BORING COMPLETED: 09-22-1988 | FOREMAN: B. Kollasch

FILE NUMBER: 220

SURFACE ELEVATION: 625.95'

CALIBRATED PENETROMETER, TONS/FT.²

UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²

WATER CONTENT PERCENT

STANDARD PENETRATION, BLOWS/FT.

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	LL = 33.0 PL = 15.0 -#200 = 92.0 k = 3.6 x 10^{-8} cm/sec	-27.5			9 10
29.0					11
29.5	Very stiff, gray, Silt, trace clay.	-30.0			11A 11B
	Very stiff, gray, silty Clay, trace fine gravel and shale. LL=30.0, PL=17.0 -#200 = 87.0				12
	— Grades to stiff.	-32.5			13
		-35.0			14
	— Grades to very stiff with lenses of fine to coarse sand from 35.0 to 37.0 feet ±.	-37.5			15
		-40.0			16
42.0					17
	Dense, gray, fine to coarse Sand, trace fine gravel and shale.	-42.5			17A 18
		-45.0			
	END OF BORING AT 45.0 feet				

γ_d = 116.3 PCF

WATER LEVEL WHILE DRILLING 3.5 feet

WATER LEVEL 25.0 feet 24 hours after completion

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

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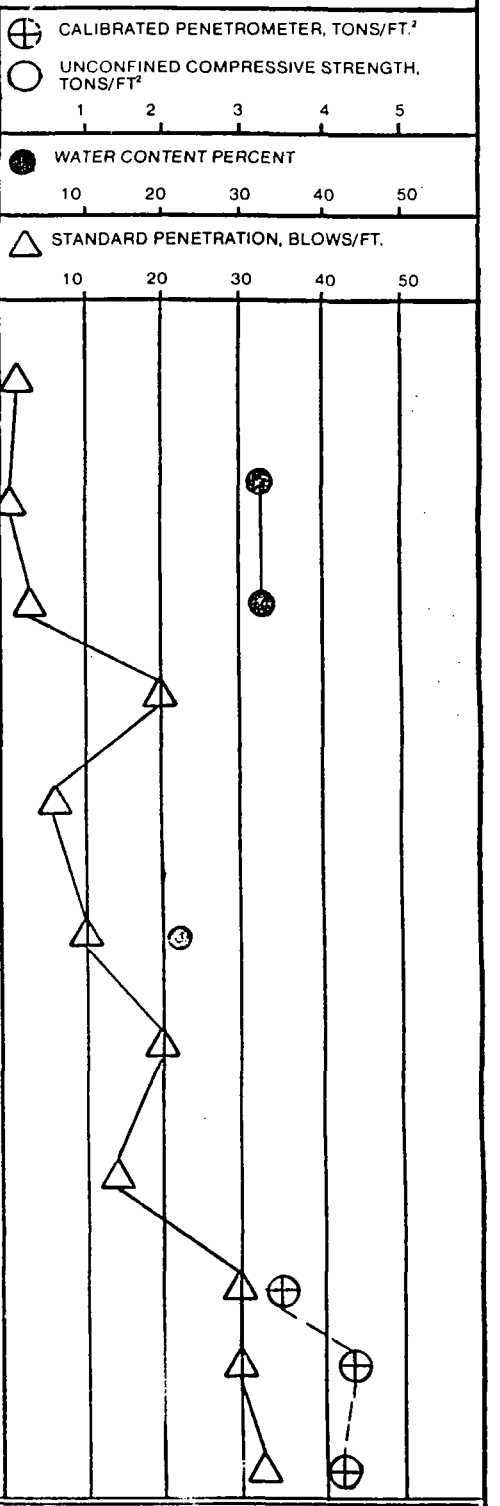
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT	LOG OF BORING NUMBER
Torrenga Engineering	M-1, Sheet 1 of 2
SITE LOCATION	**PROJECT NAME**
Colfax Avenue, Griffith, Indiana	Griffith Sanitary Landfill
BORING STARTED 11-25-86 / RIG D-50	FILE NUMBER 220
BORING COMPLETED 11-25-86 / FOREMAN B. Kollasch	

SURFACE ELEVATION 632.75'

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
0.1	Dark brown sandy topsoil.				
	Very loose brown & gray silty fine sand.	2.5			1
3.0	Medium to very soft gray organic clay.	5.0			2
6.0					3
7.0	Loose gray & black silty fine sand; roots.	7.5			4
	Loose to medium dense gray silty fine sand.	10.0			5
12.0	Medium stiff gray mottled with black silty clay to medium dense gray clayey silty fine sand.	12.5			6
14.5	Medium dense gray fine sand with seams of very stiff gray clay.	15.0			7
17.0	Medium dense gray silty fine sand with seams of very soft gray clay.	17.5			8
19.5	Very stiff to hard gray silty & sandy clay. (CL)	20.0			9
		22.5			10
		25.0			11



WATER LEVEL WHILE DRILLING 1.5 ft.

WATER LEVEL

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.

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HIGHLAND, INDIANA 46322

TELEPHONE: (219) 924-5231

CLIENT: Torrenga Engineering

LOG OF BORING NUMBER: M-1, Sheet 2 of 2

SITE LOCATION: Colfax Avenue, Griffith, Indiana

PROJECT NAME: Griffith Sanitary Landfill

BORING STARTED: 11-25-86 | RIG: D-50

BORING COMPLETED: 11-25-86 | FOREMAN: B. Kollasch

FILE NUMBER: 220

SURFACE ELEVATION: 632.75'

CALIBRATED PENETROMETER, TONS/FT.²

UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²

WATER CONTENT PERCENT

STANDARD PENETRATION, BLOWS/FT.

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Very stiff to hard gray silty & sandy clay. (CL)	27.5			12
		30.0			13
		32.5			14
		35.0			15
					16
37.0					17*
37.5	Gray coarse sand & fine gravel.	37.5			
	Stiff to very stiff gray silty sandy clay, trace shale & fine gravel. (CL)	40.0			18
		42.5			19*
44.5					20*
	Medium dense to very dense gray fine to coarse sand (SW).	45.0			21*
		47.5			22
	NOTE: * - Split spoon sampler was pushed hydraulically to obtain sample.				23
50.5		50.0			24

61

105

WATER LEVEL WHILE DRILLING 1.5 ft.

WATER LEVEL

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

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CLIENT	LOG OF BORING NUMBER
Torrenga Engineering	M-2, Sheet 1 of 3
SITE LOCATION	**PROJECT NAME**
Colfax Avenue, Griffith, Indiana	Griffith Sanitary Landfill

BORING STARTED	12-9-86	RIG	D-50	FILE NUMBER
BORING COMPLETED	12-10-86	FOREMAN	B. Kollasch	220

SURFACE ELEVATION 630.57'

CALIBRATED PENETROMETER, TONS/FT.²
UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²
WATER CONTENT PERCENT
STANDARD PENETRATION, BLOWS/FT.

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Loose light brown silty fine to medium sand with lenses of clayey sand.	2.5			1
3.0					
	Very loose, brown & dark brown silty fine sand, trace clay & brown fibrous material.	5.0			2
5.5					
	Loose, dark brown organic peat, trace roots.	7.5			3
8.0					
	Medium dense brown & gray fine to coarse sand, trace shale & fine gravel.	10.0			4
		12.5			5
13.0					
	Medium dense gray fine to coarse sand, trace silt & clay binder.	15.0			6
		17.5			
19.0					
	Very stiff & hard gray, silty, clay, trace sand (CL).	20.0			7
		22.5			8*
		25.0			9
					10*

55

WATER LEVEL WHILE DRILLING 11.0 ft. & 49.0 ft.

WATER LEVEL

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
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HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT

Torrenga Engineering

LOG OF BORING NUMBER

M-2, Sheet 2 of 3

SITE LOCATION

Colfax Avenue, Griffith, Indiana

PROJECT NAME

Griffith Sanitary Landfill

BORING STARTED 12-9-86 | RIG D-50

BORING COMPLETED 12-10-86 | FOREMAN B. Kollasch

FILE NUMBER 220

SURFACE ELEVATION 630.57'

CALIBRATED PENETROMETER, TONS/FT.²

UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²

WATER CONTENT PERCENT

STANDARD PENETRATION, BLOWS/FT.

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Very stiff & hard gray, silty, clay, trace sand (CL).	27.5			11*
	1" and 2" seams of coarse sand were noted at 39.0 ft.± and 43.5 ft. ±, respectively.	30.0			12*
		32.5			13*
		35.0			14*
		37.5			15*
		40.0			16*
		42.5			17*
		45.0			18*
		47.5			19*
49.0	Dense to very dense gray fine to coarse sand with 1" silty clay @ 50.5 ft. ±.	50.0			20*
					21*
					22*

WATER LEVEL WHILE DRILLING 11.0 ft. & 49.0 ft.

WATER LEVEL

SPLIT SPOON | SHELBY TUBE | A AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

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HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT	LOG OF BORING NUMBER
Torrenga Engineering	M-2, Sheet 3 of 3
SITE LOCATION	**PROJECT NAME**
Colfax Avenue, Griffith, Indiana	Griffith Sanitary Landfill

BORING STARTED	12-10-86	RIG	D-50	FILE NUMBER
BORING COMPLETED	12-10-86	FOREMAN	B. Kollasch	220

SURFACE ELEVATION 630.57′

CALIBRATED PENETROMETER, TONS/FT.²
UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²
1 2 3 4 5
WATER CONTENT PERCENT
10 20 30 40 50
STANDARD PENETRATION, BLOWS/FT.
10 20 30 40 50

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Dense to very dense gray fine to coarse sand with 1" silty clay @ 50.5 ft. ±	52.5			23
55.0		55.0			24
	END OF BORING				
	NOTE: * - The split spoon sampler was pushed hydraulically to obtain samples.				

112

WATER LEVEL WHILE DRILLING 11.0 ft. & 49.0 ft.

WATER LEVEL

SPLIT SPOON SHELBY TUBE A AUGER ROCK CORE

+PL - PLASTIC LIMIT +LL - LIQUID LIMIT γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
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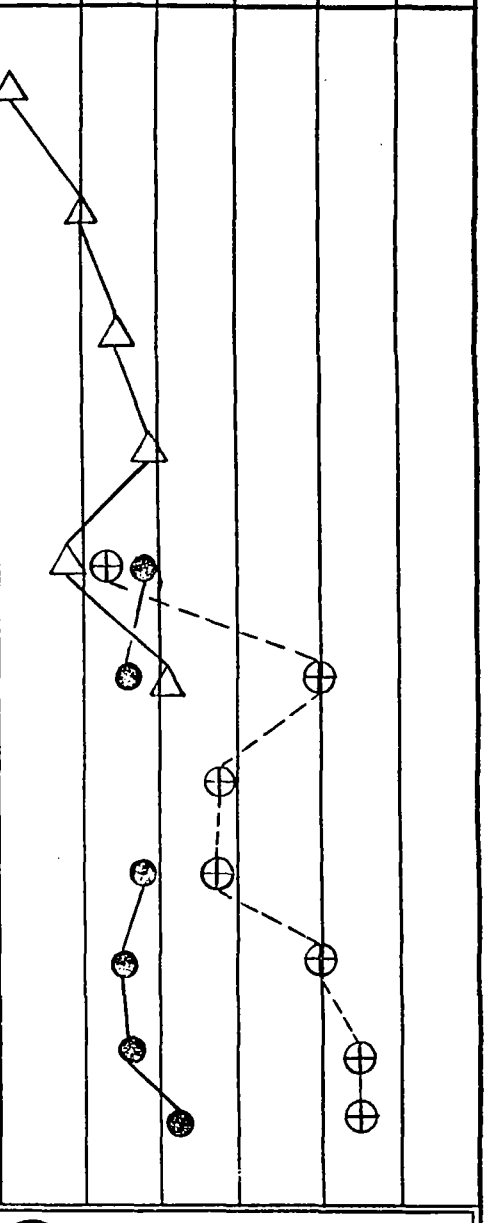
CLIENT	LOG OF BORING NUMBER
Torrenga Engineering	M-3, Sheet 1 of 2
SITE LOCATION	**PROJECT NAME**
Colfax Avenue, Griffith, Indiana	Griffith Sanitary Landfill

BORING STARTED	12-8-86	RIG	D-50	FILE NUMBER
BORING COMPLETED	12-8-86	FOREMAN	B. Kollasch	220

SURFACE ELEVATION 626.09'

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
3.0	Very loose black & dark brown silty fine sand, trace roots.	2.5			1
5.5	Medium dense gray fine to coarse sand, trace silt & roots.	5.0			2
12.0	Medium dense gray fine to coarse sand, trace shale & fine gravel.	7.5			3
		10.0			4
		12.5			5
17.5	Stiff to very stiff gray silty and sandy clay or sandy and clayey silt. (CL-ML).	15.0			6
		17.5			7*
23.0	Very stiff & hard gray silty clay, trace shale & fine gravel.	20.0			8*
		22.5			9*
24.0	Hard gray silty clay, trace shale& gravel				10*
	Dense gray coarse sand, trace shale &grave	25.0			11*



WATER LEVEL WHILE DRILLING 3.0 ft.

WATER LEVEL

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.

9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322

TELEPHONE: (219) 924-5231

CLIENT: Torrenga Engineering	LOG OF BORING NUMBER: M-3, Sheet 2 of 2
SITE LOCATION: Colfax Avenue, Griffith, Indiana	PROJECT NAME: Griffith Sanitary Landfill
BORING STARTED: 12-8-86 / RIG: D-50	FILE NUMBER: 220
BORING COMPLETED: 12-8-86 / FOREMAN: B. Kollasch	
SURFACE ELEVATION: 626.09'	

CALIBRATED PENETROMETER, TONS/FT.²
UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²
1 2 3 4 5
WATER CONTENT PERCENT
10 20 30 40 50
STANDARD PENETRATION, BLOWS/FT.
10 20 30 40 50

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Dense gray coarse sand, trace shale & gravel.	27.5			12
		30.0			13
31.0					14
	END OF BORING				
	NOTE: * - The split spoon sampler was pushed hydraulically to obtain samples.				

WATER LEVEL WHILE DRILLING 3.0 ft.
WATER LEVEL

SPLIT SPOON | SHELBY TUBE | A AUGER | ROCK CORE
+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
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HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT
Torrenga Engineering

LOG OF BORING NUMBER
M-4, Sheet 1 of 2

SITE LOCATION
Colfax Avenue, Griffith, Indiana

PROJECT NAME
Griffith Sanitary Landfill

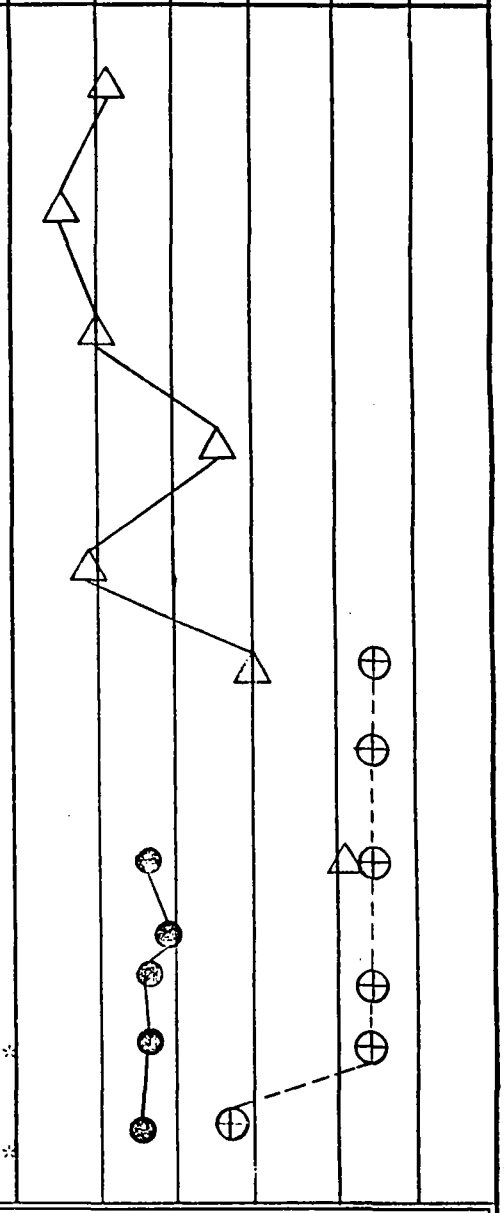
BORING STARTED 12-3-86 | RIG D-50
BORING COMPLETED 12-3-86 | FOREMAN B. Kollasch

FILE NUMBER 220

SURFACE ELEVATION 627.13'

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Medium dense dark brown & gray silty fine sand, trace roots.	2.5			1
5.0	Loose gray silty sand, trace roots, oily smell noted.	5.0			2
5.5	Medium dense gray coarse sand & fine gravel.	7.5			3
9.0	Medium dense gray silty fine sand, with lenses of gray silty clay.	10.0			4
12.5		12.5			5
13.0	Very stiff gray mottled black silty clay trace sand (CL).				
	Hard gray streaked with brown silty clay, trace sand (CL).	15.0			6
		17.5			7
19.0					8
19.5	Medium dense gray clayey silt.	20.0			9
	Hard gray silty clay, trace shale & fine gravel.	22.5			10*
23.0					
	Stiff gray silty clay, trace shale & fine gravel.	25.0			11*

CALIBRATED PENETROMETER, TONS/FT.²
UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²
1 2 3 4 5
WATER CONTENT PERCENT
10 20 30 40 50
STANDARD PENETRATION, BLOWS/FT.
10 20 30 40 50



WATER LEVEL WHILE DRILLING 3.0 ft., 37.5 ft. & 45.0 ft.
WATER LEVEL

SPLIT SPOON | SHELBY TUBE | A AUGER | ROCK CORE
+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
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CLIENT
Torrenga Engineering

LOG OF BORING NUMBER
M-4, sheet 2 of 2

SITE LOCATION
Colfax Avenue, Griffith, Indiana

PROJECT NAME
Griffith Sanitary Landfill

BORING STARTED 12-3-86 | RIG D-50

BORING COMPLETED 12-3-86 | FOREMAN B. Kollasch

FILE NUMBER 220

SURFACE ELEVATION 627.13'

CALIBRATED PENETROMETER, TONS/FT.²
UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²
1 2 3 4 5
WATER CONTENT PERCENT
10 20 30 40 50
STANDARD PENETRATION, BLOWS/FT.
10 20 30 40 50

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	Very stiff gray silty clay, trace shale & fine gravel with lenses of silt.	27.5			12*
		30.0			13*
31.0					14*
	Hard gray silty clay, trace shale & fine gravel.	32.5			15*
33.0					
	Very stiff gray silty clay, trace shale & fine gravel with seam of fine sand @ 37.0 ft.	35.0			16*
					17*
37.5		37.5			18
	Very dense gray fine to coarse sand, trace shale & fine to medium gravel.				
39.0					
	Very stiff gray silty clay, trace shale & fine gravel.	40.0			19
		42.5			20*
					21*
45.0		45.0			
	Medium dense gray fine to coarse gravelly sand (SP).				22*
		47.5			23
51.0					24

64

WATER LEVEL WHILE DRILLING
WATER LEVEL

END OF BORING
3.0 ft., 37.5 ft., & 45.0 ft.

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
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TELEPHONE: (219) 924-5231

CLIENT: Torrenga Engineering

LOG OF BORING NUMBER: M-5

SITE LOCATION: Colfax Avenue, Griffith, Indiana

PROJECT NAME: Griffith Sanitary Landfill

BORING STARTED: 09-23-1988 | RIG: D-50

BORING COMPLETED: 09-23-1988 | FOREMAN: B. Kollasch

FILE NUMBER: 220

SURFACE ELEVATION: 628.45'

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
0.5	Brown, Peat (topsoil).				
1.0	Black, organic Silt (topsoil).				
	Medium dense, brown, silty fine Sand.	2.5			1
3.0	Medium dense, gray, silty fine Sand with lenses of gray silty clay.	5.0			2
5.5	Medium stiff, gray, clayey Silt,				3
6.5	little fine sand.				3A
	Medium dense, gray, silty fine to coarse	7.5			
8.0	Sand, trace fine gravel and shale.				4
	Medium dense, gray, silty fine to coarse Sand, trace fine gravel and shale.	10.0			
	— Grades with lenses and seams of stiff, gray, silty clay.				5
11.5	Very stiff, gray, silty Clay, trace fine gravel and shale.	12.5			5A
	LL = 28.0, PL = 10.0				6
	— Grades to hard. -#200 = 81.0	15.0			
					7
		17.5			
	— Grades to very stiff.				8
	LL = 31.0 PL = 12.0 -#200 = 84.0				9
		20.0			9A
20.5	Dense, gray, fine to coarse Sand, trace fine gravel and shale.				9B
					10
	— Grades to very dense.	22.5			
					11
	— Grades to medium dense.				11A
		25.0			

CALIBRATED PENETROMETER, TONS/FT.²

UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²

1 2 3 4 5

WATER CONTENT PERCENT

10 20 30 40 50

STANDARD PENETRATION, BLOWS/FT.

10 20 30 40 50

54

WATER LEVEL WHILE DRILLING 8.0/20.5 feet

WATER LEVEL

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE

+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

CLIENT: Torrenga Engineering	LOG OF BORING NUMBER: M-5
SITE LOCATION: Colfax Avenue, Griffith, Indiana	PROJECT NAME: Griffith Sanitary Landfill
BORING STARTED: 09-23-1988 / RIG: D-50	FILE NUMBER: 220
BORING COMPLETED: 09-23-1988 / FOREMAN: B. Kollasch	
SURFACE ELEVATION: 628.45'	

CALIBRATED PENETROMETER, TONS/FT.²
UNCONFINED COMPRESSIVE STRENGTH, TONS/FT²
1 2 3 4 5
WATER CONTENT PERCENT
10 20 30 40 50
STANDARD PENETRATION, BLOWS/FT.
10 20 30 40 50

STRATA DEPTH (FT.)	DESCRIPTION OF MATERIAL	DEPTH (FT.)	SAMPLE TYPE	SAMPLE RECOVERY	SAMPLE NUMBER
	— Grades to dense.				12
		27.5			
	— Grades to very dense				13
30.0		30.0			14
	Very dense, grayish white, fine to coarse Sand.				
	END OF BORING AT 31.0 feet				

57
74

Note: Observation Well M-5 was installed in this borehole with screen from 24.0 feet to 29.0 feet.

WATER LEVEL WHILE DRILLING 8.0/20.5 feet
WATER LEVEL

SPLIT SPOON | SHELBY TUBE | AUGER | ROCK CORE

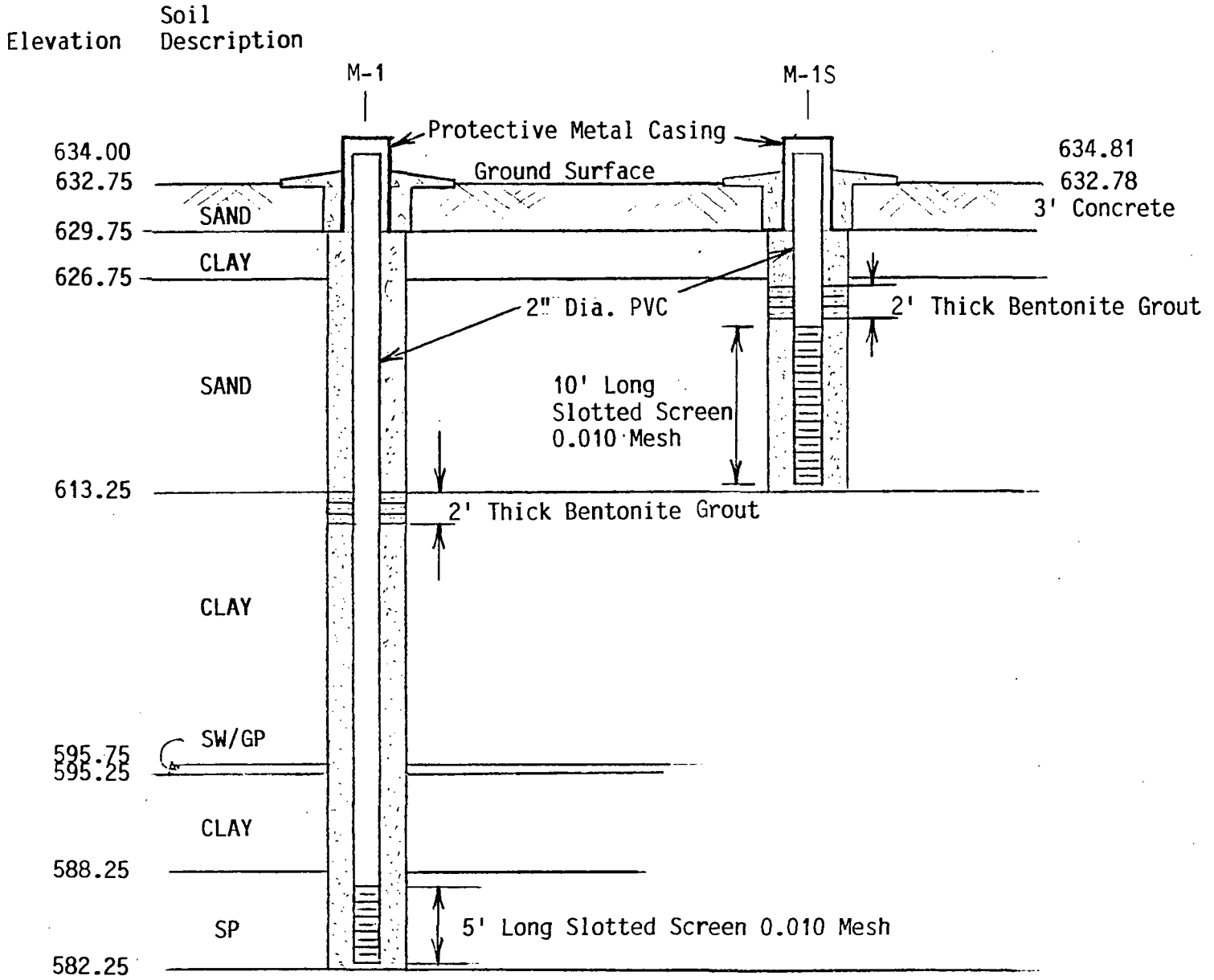
+PL - PLASTIC LIMIT | +LL - LIQUID LIMIT | γ_d - UNIT DRY WEIGHT

K & S TESTING AND ENGINEERING INC.
9715 KENNEDY AVENUE
HIGHLAND, INDIANA 46322
TELEPHONE: (219) 924-5231

APPENDIX B

DETAILS OF GROUNDWATER MONITORING WELLS

DETAILS OF MONITORING WELLS
M-1 and M-1S



Concrete

Bentonite Grout

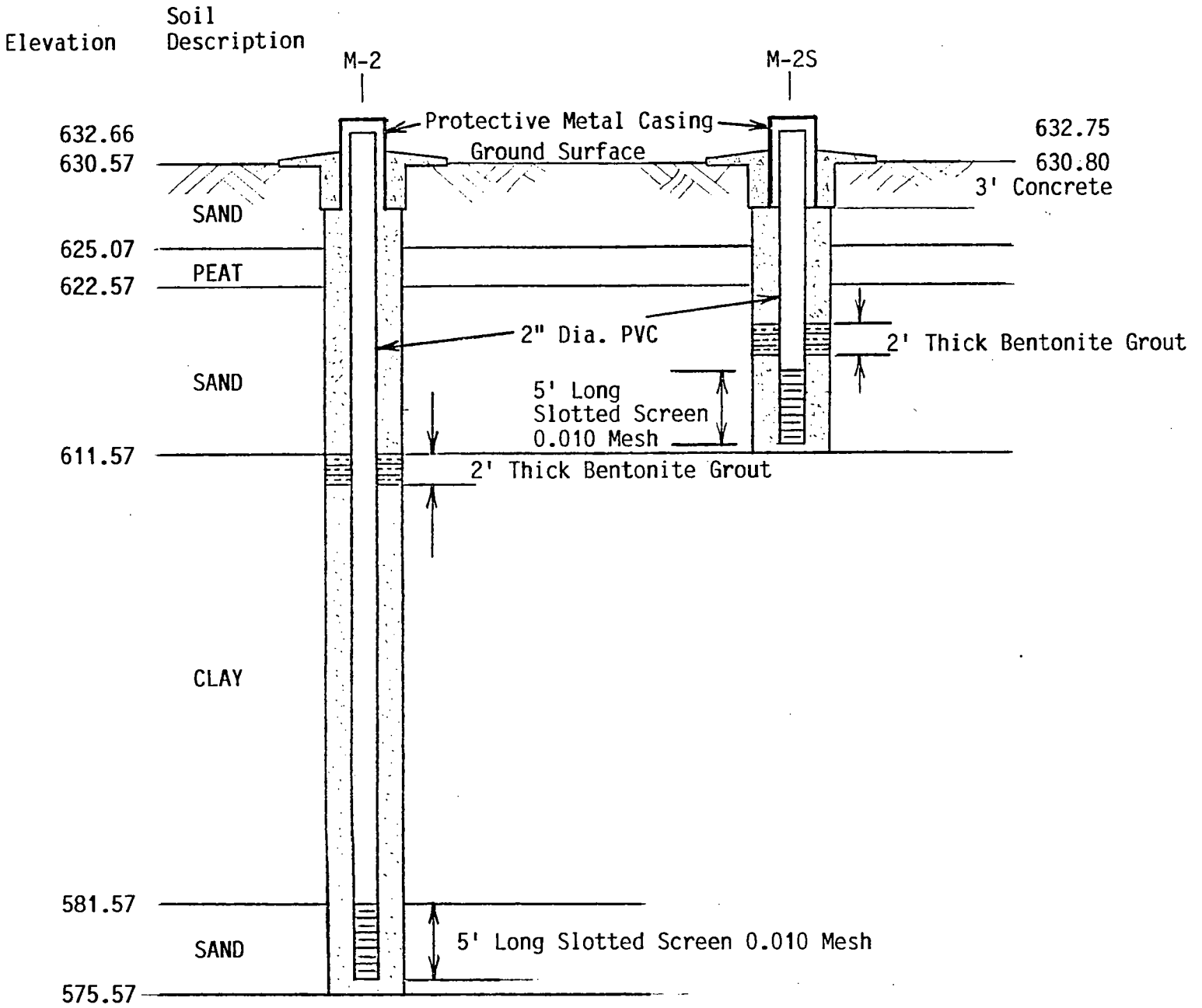
Granular Backfill

Well Screen

DATE	WATER LEVEL ELEVATION	REMARKS
12-30-86	619.10	Water level elevations are for M-1
06-05-87	619.50	
7-27-87	617.16	
10-29-87	618.44	
01-26-88	619.25	
04-28-88	619.00	
07-28-88	618.00(?)	
10-24-88	614.50	

Note: Water level elevation for M-1S on 10-24-88 is 628.31

DETAILS OF MONITORING WELLS
M-2 and M-2S



Concrete

Bentonite Grout

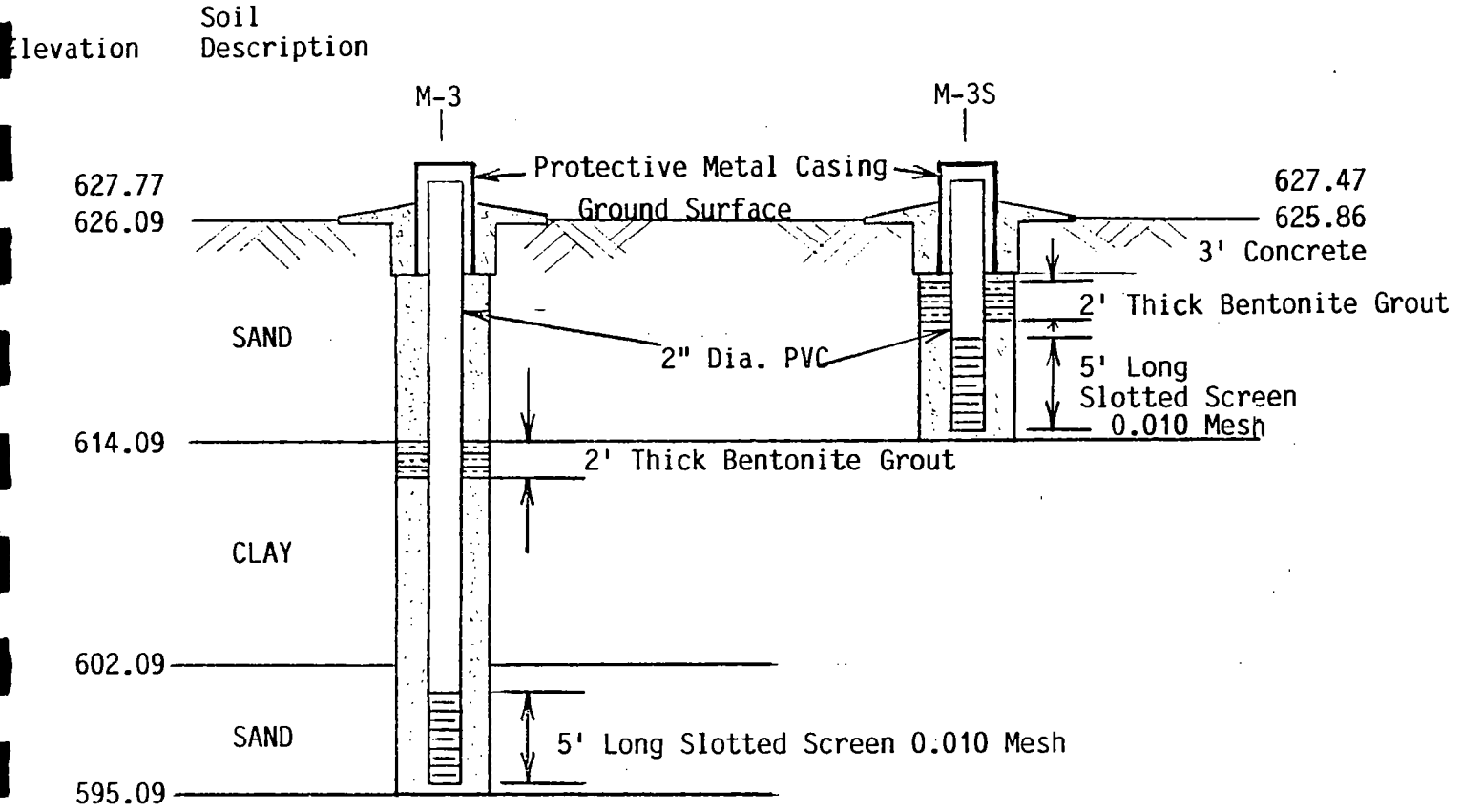
Granular Backfill

Well Screen

DATE	Water Level ELEVATION	REMARKS
12-30-86	618.66	Water level elevations are for M-2
06-05-87	618.87	
07-27-87	616.66	
10-29-87	616.89	
01-26-88	618.86	
04-28-88	618.66	
07-28-88	617.66(?)	
10-24-88	613.16	

Note: Water level elevations for M-2S on 10-24-88 is 619.55

DETAILS OF MONITORING WELLS
M-3 and M-3S



Concrete

Bentonite Grout

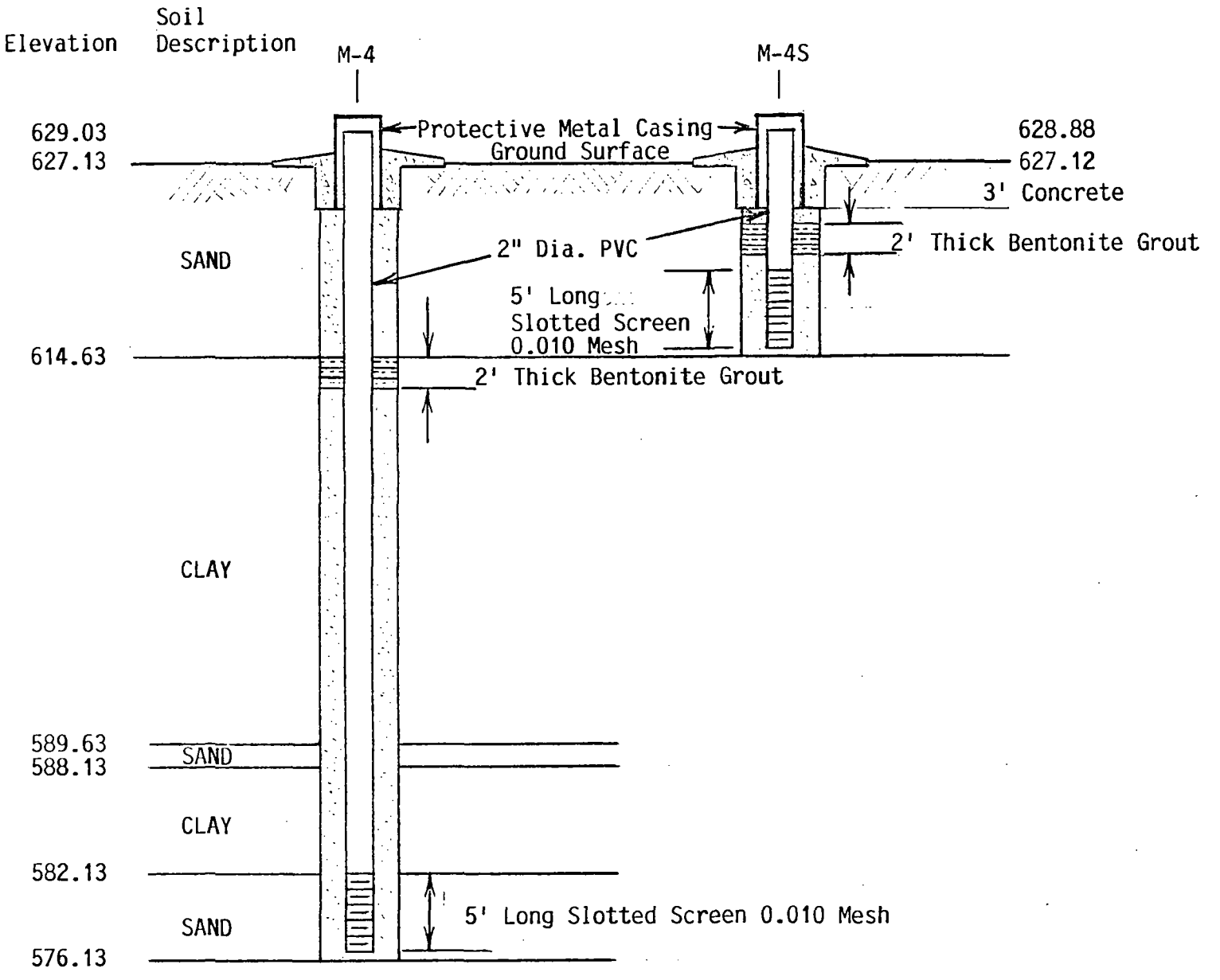
Granular Backfill

Well Screen

DATE	Water Level ELEVATION	REMARKS
12-30-86	618.59	Water level elevations are for M-3
06-05-87	618.77	
07-27-87	616.52	
10-29-87	616.77	
01-26-88	618.77	
04-28-88	618.57	
07-28-88	617.77(?)	
10-24-88	612.77	

Note: Water level elevation for M-3s on 10-24-88 is 620.67

DETAILS OF MONITORING WELLS
M-4 and M-4S



Concrete

Bentonite Grout

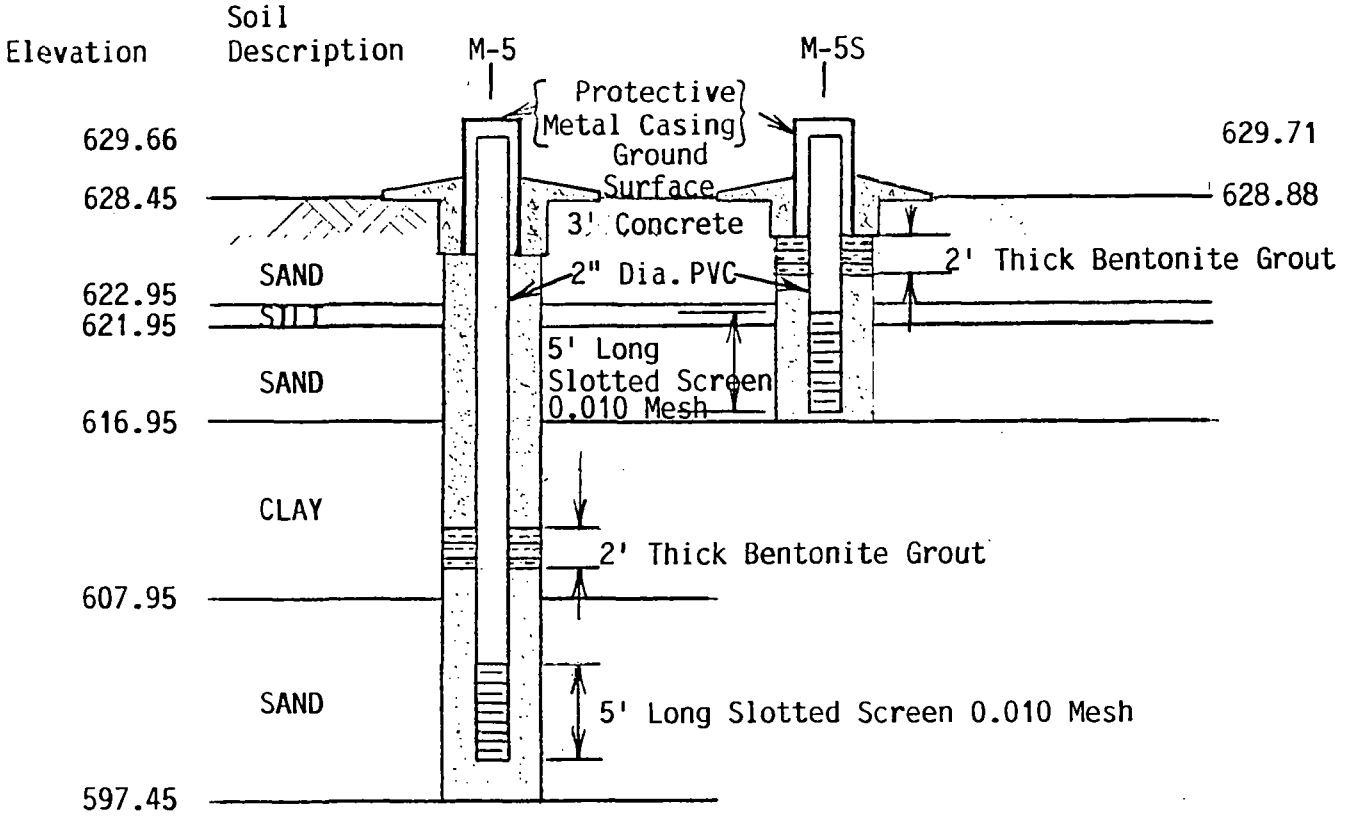
Granular Backfill

Well Screen

DATE	Water Level ELEVATION	REMARKS
12-30-86	618.77	Water level elevations are for M-4
06-05-87	619.11	
07-27-87	616.83	
10-29-87	617.07	
01-26-88	619.03	
04-28-88	618.53	
07-28-88	617.00(?)	
10-24-88	614.03	

Note: Water level elevations for M-4S on 10-24-88 is 624.26

DETAILS OF MONITORING WELLS
M-5 and M-5S



Concrete

Bentonite Grout

Granular Backfill

Well Screen

DATE	Water Level ELEVATION	REMARKS
10-24-88	612.66	For M-5
10-24-88	623.50	For M-5S

APPENDIX C
PHYSICAL AND STRENGTH CHARACTERISTICS

SOIL TEST DATA

PROJECT Griffith Landfill CITY OR COUNTY Griffith, IN

LAB NO.	220-1	220-2	220-3
LOCATION	3" Shelby tube 3' South of Boring 6	3" Shelby tube 5' SE of Boring 6	Boring 6
DEPTH (feet)	0.0 - 1.5	0.0 - 1.5	5.5 - 7.0
GRAIN SIZE CLASSIFICATN	Gray silty clay (CL)	Gray silty clay (CL)	Gray silty clay (CL)
PASSING 1" SIEVE %			
3/4" " %			
1/2" " %			
No 4 " %	100.0	100.0	100.0
No 10 " %	99.2	99.2	99.3
No 40 " %	95.7	95.7	96.2
No 100 " %	92.9	92.9	93.1
No 200 " %	90.8	90.8	90.2
GRAVEL %			
SAND %	9.0	9.0	10.0
FINES (silt & clay) %	91.0	91.0	90.0
LIQUID LIMIT %	32.0	32.0	31.0
PLASTIC LIMIT %	19.0	19.0	17.0
PLASTICITY INDEX %	13.0	13.0	14.0
DRY DENSITY PCF	116.2	107.1	
PROCTOR DENSITY PCF			
OPTIMUM MOISTURE %			
PERCENT DENSITY %			
COEFF. OF PERMEABL cm/sec	2.1×10^{-8}	2.4×10^{-8}	

REMARKS:

SOIL TEST DATA

PROJECT Griffith Landfill CITY OR COUNTY Griffith, IN

LAB NO.	220-4	220-5	
LOCATION	Boring 7	Boring 8	
DEPTH	16.0 - 17.5	21.0 - 23.0	
GRAIN SIZE CLASSIFICATN	Gray silty clay (CL)	Gray silty clay (CL)	
PASSING 1" SIEVE %			
3/4" " %			
1/2" " %	100.0	100.0	
No 4 " %	99.2	99.5	
No 10 " %	98.6	98.3	
No 40 " %	96.2	96.3	
No 100 " %	92.8	93.5	
No 200 " %	90.7	91.5	
GRAVEL %	1.0	1.0	
SAND %	8.0	8.0	
NES (silt & clay) %	91.0	91.0	
LIQUID LIMIT %	31.0	29.0	
PLASTIC LIMIT %	19.0	17.0	
PLASTICITY INDEX %	12.0	12.0	
DRY DENSITY PCF			
PROCTOR DENSITY PCF			
OPTIMUM MOISTURE %			
PERCENT DENSITY %			
COEFF. OF PERMEABL cm/sec			

REMARKS:

SOIL TEST DATA

PROJECT Griffith Landfill CITY OR COUNTY Griffith, Indiana

LAB NO.	220-6	220-7	220-8
LOCATION	Monitoring Well No. 1	Monitoring Well No. 1	Monitoring Well No. 1
DEPTH (feet)	21.5-25.5	41.5-44.5	45.5-47.5
GRAIN SIZE CLASSIFICATN	Gray silty & sandy clay (CL)	Gray silty & sandy clay, trace gravel (CL)	Gray fine to coarse sand (SW)
PASSING 1" SIEVE %			
3/4" " %		100.0	
1/2" " %	100.0	98.1	100.0
No 4 " %	99.6	97.6	99.6
No 10 " %	93.7	94.1	78.4
No 40 " %	92.0	92.5	18.9
No 100 " %	89.0	87.7	4.7
No 200 " %	83.8	80.8	0.8
GRAVEL %		3.0	
SAND %	17.0	17.0	99.0
FINES (silt & clay) %	83.0	80.0	1.0
LIQUID LIMIT %	30.0	27.0	
PLASTIC LIMIT %	21.0	15.0	
PLASTICITY INDEX %	9.0	12.0	
DRY DENSITY PCF			
PROCTOR DENSITY PCF			
OPTIMUM MOISTURE %			
PERCENT DENSITY %			
COEFF. OF PERMEABL cm/sec			

REMARKS:

SOIL TEST DATA

PROJECT Griffith Landfill CITY OR COUNTY Griffith, Indiana

LAB NO.	220-9	220-10	220-11
LOCATION	Monitoring Well No. 2	Monitoring Well No. 3	Monitoring Well No. 4
DEPTH (feet)	28.0 - 30.0	15.0 - 17.0	11.0 - 15.0
GRAIN SIZE CLASSIFICATN	Gray silty clay trace sand (CL)	Gray silty & sandy clay or sandy & clayey silt(CL-ML)	Gray silty clay trace sand (CL)
PASSING 1" SIEVE %			
3/4" " %			
1/2" " %		100.0	
No 4 " %	99.6	99.0	100.0
No 10 " %	98.6	98.1	99.6
No 40 " %	96.2	92.5	96.4
No 100 " %	92.9	79.0	90.8
No 200 " %	90.7	72.0	89.2
GRAVEL %		1.0	
SAND %	9.0	27.0	11.0
FINES (silt & clay) %	91.0	72.0	89.0
LIQUID LIMIT %	31.0	20.0	35.0
PLASTIC LIMIT %	18.0	14.0	18.0
PLASTICITY INDEX %	13.0	7.0	17.0
DRY DENSITY PCF	115.3	121.9	
PROCTOR DENSITY PCF			
OPTIMUM MOISTURE %			
PERCENT DENSITY %			
COEFF. OF PERMEABL cm/sec	1.6×10^{-8}	1.4×10^{-6}	

REMARKS:

SOIL TEST DATA

PROJECT Griffith Landfill CITY OR COUNTY Griffith , Indiana

LAB NO.	220-12	220-13	
LOCATION	Monitoring Well No. 4	Monitoring Well No. 4	
DEPTH (feet)	15.0 - 16.5	45.0 - 47.0	
GRAIN SIZE CLASSIFICATN	Gray silty clay trace sand (CL)	Gray fine to coarse gravely sand (SW)	
PASSING 1" SIEVE %			
3/4" " %			
1/2" " %	100.0	100.0	
No 4 " %	99.9	87.2	
No 10 " %	98.8	60.6	
No 40 " %	96.6	20.0	
No 100 " %	93.9	6.5	
No 200 " %	92.3	4.7	
GRAVEL %		13.0	
SAND %	8.0	82.0	
NES (silt & clay) %	92.0	5.0	
LIQUID LIMIT %	28.0		
PLASTIC LIMIT %	16.0		
PLASTICITY INDEX %	12.0		
DRY DENSITY PCF	121.0		
PROCTOR DENSITY PCF			
OPTIMUM MOISTURE %			
PERCENT DENSITY %			
COEFF. OF PERMEABL cm/sec	1.9×10^{-8}		

REMARKS:

SOIL TEST DATA

PROJECT Griffith Sanitary Landfill CITY OR COUNTY Griffith

LAB NO.	220-24		220-14		220-15	
LOCATION	SB-9 SS-3		SB-9 SS-8		SB-9 SS-10	
DEPTH (feet)	7.5		17.0-19.0		21.0-23.0	
AIN SIZE CLASSIFICATN	Gray, fine to medium sand (SP)		Gray, silty clay with sand (CL)		Gray, silty clay with sand (CL)	
PASSING 1" SIEVE %						
3/4" " %						
1/2" " %			100.0			
No 4 " %	100.0		99.5		100.0	
No 10 " %	98.9		97.1		98.8	
No 40 " %	95.8		91.1		94.7	
No 100 " %	10.3		83.5		90.2	
No 200 " %	2.7		79.5		87.7	
GRAVEL %	0.0		1.0		0.0	
SAND %	97.0		19.0		12.0	
..ES (silt & clay) %	3.0		80.0		88.0	
LIQUID LIMIT %			28.0		30.0	
PLASTIC LIMIT %			17.0		11.0	
PLASTICITY INDEX %			11.0		19.0	
DRY DENSITY PCF						
PROCTOR DENSITY PCF						
OPTIMUM MOISTURE %						
PERCENT DENSITY %						
COEFF. OF PERMEABL cm/sec						

REMARKS:

SOIL TEST DATA

PROJECT Griffith Sanitary Landfill CITY OR COUNTY Griffith

LAB NO.	220-25		220-26		220-16	
LOCATION	SB-9 SS-11		SB-10 SS-2A		SB-10 SS-7	
DEPTH (feet)	23.0-25.0		9.0-10.0		21.0-23.0	
GRAIN SIZE CLASSIFICATN	Light gray fine to coarse sand (SP)		Gray, silty fine to coarse sand (SP-SM)		Gray silty clay (CL)	
PASSING 1" SIEVE %						
3/4" " %						
1/2" " %	100.0		100.0		100.0	
No 4 " %	99.0		99.1		99.9	
No 10 " %	93.3		95.9		98.5	
No 40 " %	62.5		88.9		95.6	
No 100 " %	4.4		20.9		92.8	
No 200 " %	2.8		4.8		90.9	
GRAVEL %	1.0		1.0		0.0	
SAND %	96.0		94.0		9.0	
FINES (silt & clay) %	3.0		5.0		91.0	
LIQUID LIMIT %					34.0	
PLASTIC LIMIT %					21.0	
PLASTICITY INDEX %					13.0	
DRY DENSITY PCF						
PROCTOR DENSITY PCF						
OPTIMUM MOISTURE %						
PERCENT DENSITY %						
COEFF. OF PERMEABL cm/sec						

REMARKS:

SOIL TEST DATA

PROJECT Griffith Sanitary Landfill CITY OR COUNTY Griffith

LAB NO.	220-17		220-18		220-27	
LOCATION	SB-10 ST-1		SB-10 SS-11B		SB-10 SS-17A	
DEPTH (feet)	25.0-27.0		30.5-31.0		42.0-43.0	
GRAIN SIZE CLASSIFICATN	Gray silty clay (CL)		Gray silty clay (CL)		Gray, fine to coarse sand trace fine gravel (SP)	
PASSING 1" SIEVE %					100.0	
3/4" " %					94.8	
1/2" " %			100.0		94.3	
No 4 " %	100.0		98.4		93.6	
No 10 " %	99.6		97.3		90.3	
No 40 " %	96.3		93.5		29.6	
No 100 " %	93.8		89.3		2.1	
No 200 " %	91.9		86.7		1.4	
GRAVEL %	0.0		2.0		6.0	
SAND %	8.0		11.0		93.0	
FINES (silt & clay) %	92.0		87.0		1.0	
LIQUID LIMIT %	33.0		30.0			
PLASTIC LIMIT %	15.0		17.0			
PLASTICITY INDEX %	18.0		13.0			
DRY DENSITY PCF	116.3					
PROCTOR DENSITY PCF						
OPTIMUM MOISTURE %						
PERCENT DENSITY %						
COEFF. OF PERMEABL cm/sec						

REMARKS:

SOIL TEST DATA

PROJECT Griffith Sanitary Landfill CITY OR COUNTY Griffith

LAB NO.	220-21		220-19		220-20	
LOCATION	M-5 SS-4		M-5 SS-6		M-5 SS-9	
DEPTH (feet)	10.0		15.0		19.0-20.0	
GRAIN SIZE CLASSIFICATN	Gray, silty fine to medium sand (SP-SM)		Gray, silty clay with sand, trace fine gravel (CL)		Gray, silty clay with sand, trace fine gravel (CL)	
PASSING 1" SIEVE %						
3/4" " %						
1/2" " %	100.0		100.0		100.0	
No 4 " %	99.4		98.4		98.0	
No 10 " %	98.5		96.1		93.9	
No 40 " %	96.0		91.7		90.2	
No 100 " %	24.5		85.3		86.2	
No 200 " %	7.0		81.1		84.2	
GRAVEL %	1.0		2.0		2.0	
SAND %	92.0		17.0		14.0	
FINES (silt & clay) %	7.0		81.0		84.0	
LIQUID LIMIT %			28.0		31.0	
PLASTIC LIMIT %			10.0		12.0	
PLASTICITY INDEX %			18.0		19.0	
DRY DENSITY PCF						
PROCTOR DENSITY PCF						
OPTIMUM MOISTURE %						
PERCENT DENSITY %						
COEFF. OF PERMEABL cm/sec						

REMARKS:

SOIL TEST DATA

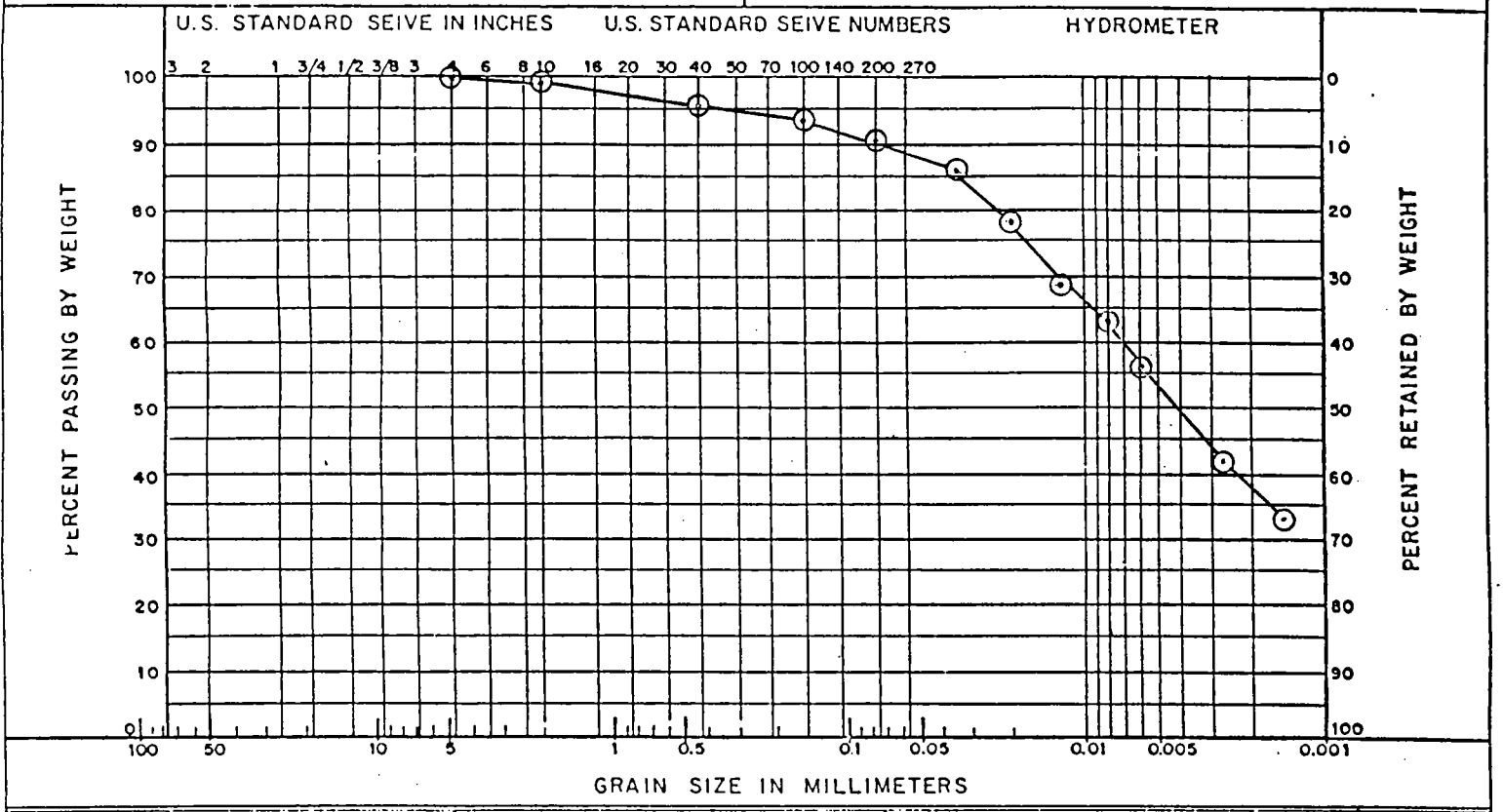
PROJECT Griffith Sanitary Landfill CITY OR COUNTY Griffith

LAB NO.	220-22		220-23			
LOCATION	M-5 SS-12		M-5 SS-14			
DEPTH (feet)	25.0-27.0		29.0-31.0			
GRAIN SIZE CLASSIFICATN	Gray, fine to coarse sand, trace fine gravel (SP-SM)		Gray, fine to coarse sand (SP			
PASSING 1" SIEVE %						
3/4" " %						
1/2" " %	100.0		100.0			
No 4 " %	98.4		98.8			
No 10 " %	95.1		94.1			
No 40 " %	71.8		72.1			
No 100 " %	10.2		7.3			
No 200 " %	6.2		2.2			
GRAVEL %	2.0		1.0			
SAND %	92.0		97.0			
FINES (silt & clay) %	6.0		2.0			
LIQUID LIMIT %						
PLASTIC LIMIT %						
PLASTICITY INDEX %						
DRY DENSITY PCF						
PROCTOR DENSITY PCF						
OPTIMUM MOISTURE %						
PERCENT DENSITY %						
COEFF. OF PERMEABL cm/sec						

REMARKS:

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE				
ASTM	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
			COARSE	MEDIUM	FINE				
AASHO	GRAVEL			SAND		SILT		CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE				

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

Near
T.B. NO. SB-6 S. NO. ST#2 DEPTH FT. 1.5 FILE NO. 220

DESCRIPTION: Gray silty clay (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	
PERCENT OF SAND	=	9.0
PERCENT OF SILT > FINES	=	91.0
PERCENT OF CLAY > FINES		

METHOD

ASTM D 422-72 _____

OTHER _____

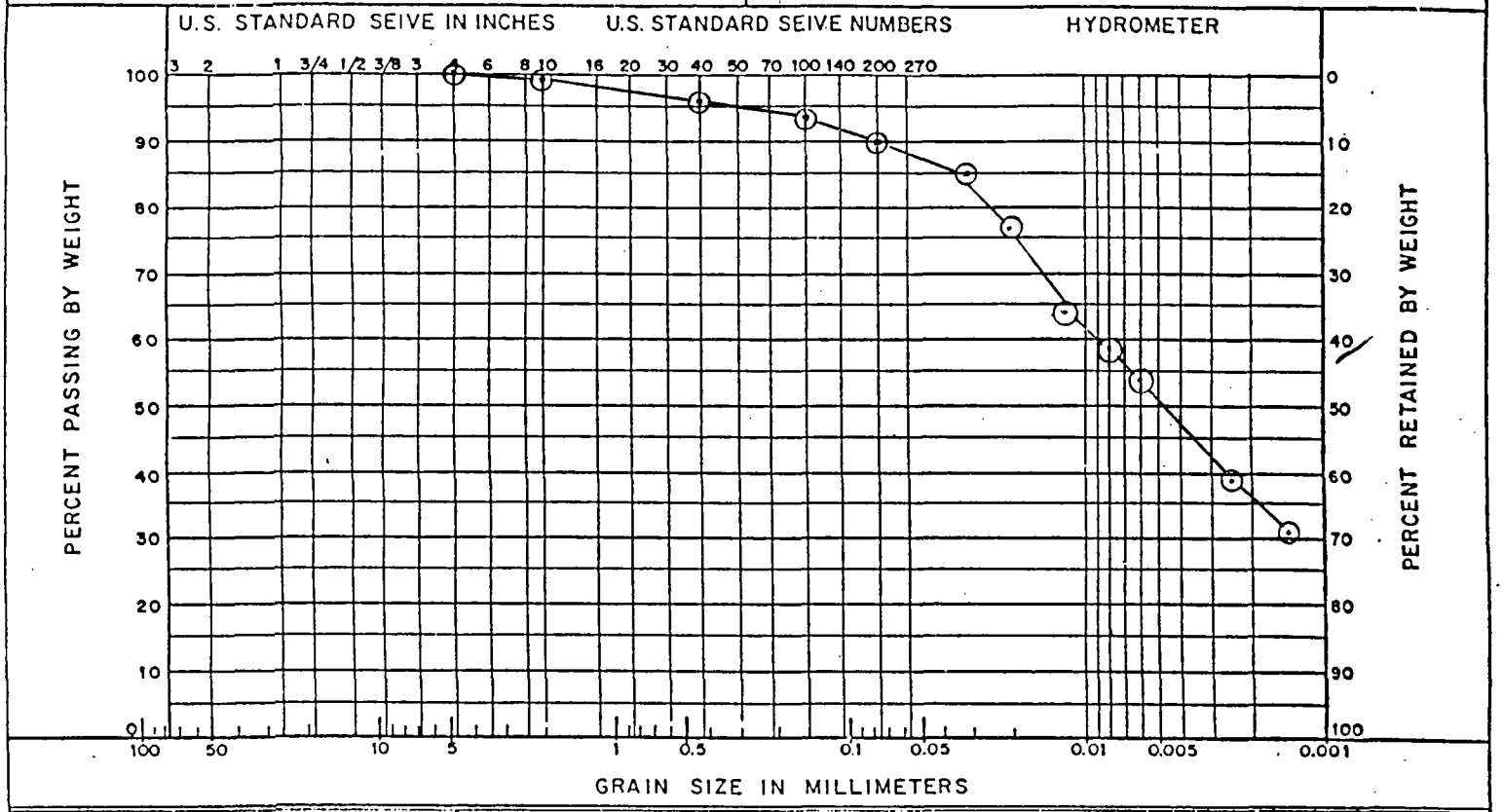
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-6 S. NO. 4 DEPTH FT. 7.0 FILE NO. 220

DESCRIPTION: Gray silty Clay (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	
PERCENT OF SAND	=	10.0
PERCENT OF SILT > FINES	=	90.0
PERCENT OF CLAY > FINES		

METHOD

ASTM D 422-72 _____

OTHER _____

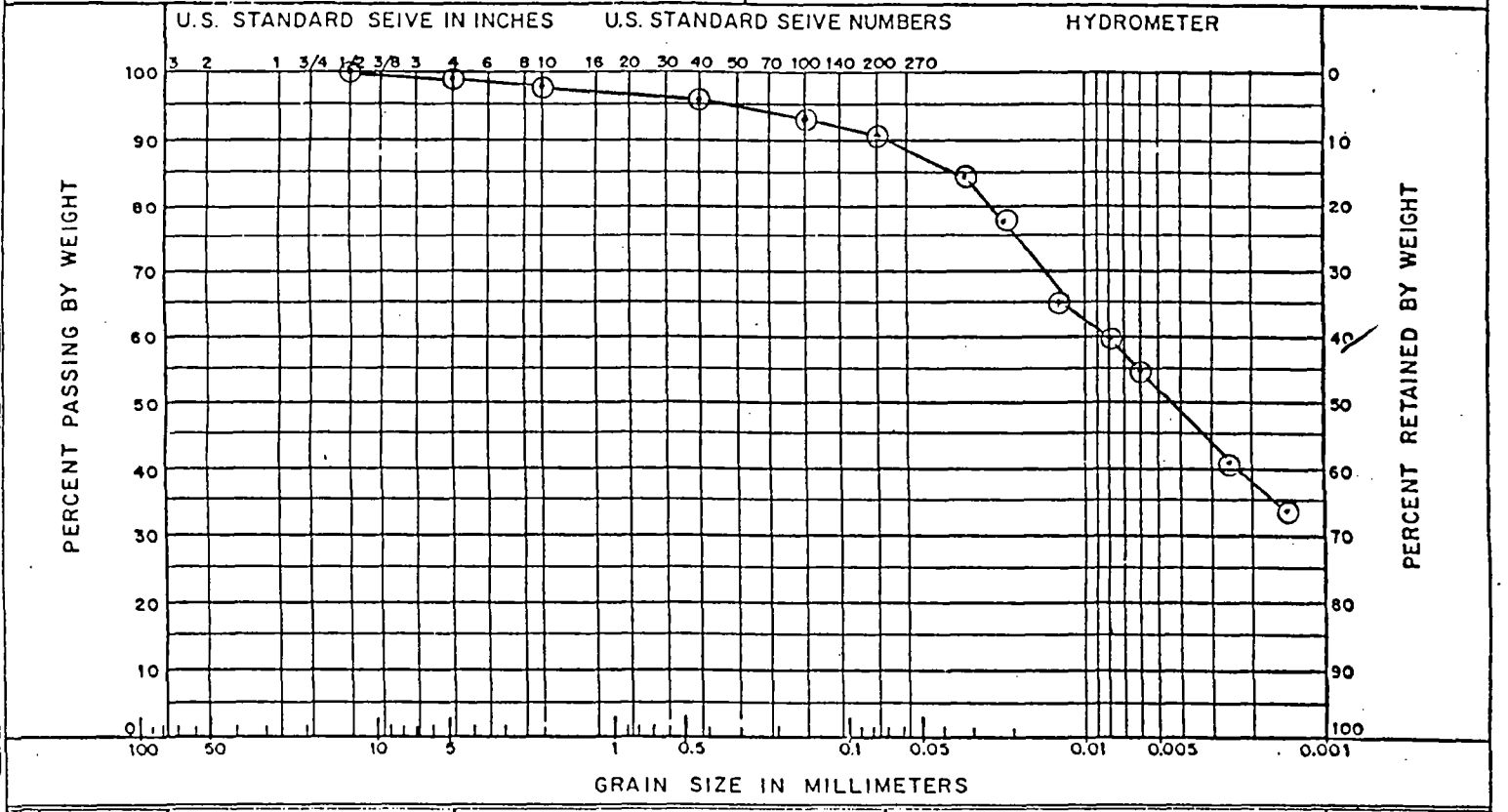
GRAIN SHAPE KEY

A - WELL ROUNDED	D - SUBANGULAR	G - FLAKE
B - ROUNDED	E - ANGULAR	H - POROUS
C - SUBROUNDED	F - ELONGATED	I - _____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-7 S. NO. 10 DEPTH FT. 17.5 FILE NO. 220

DESCRIPTION: Gray silty clay (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	1.0
PERCENT OF SAND	=	8.0
PERCENT OF SILT > FINES	=	91.0
PERCENT OF CLAY		

METHOD

ASTM D 422-72 _____

OTHER _____

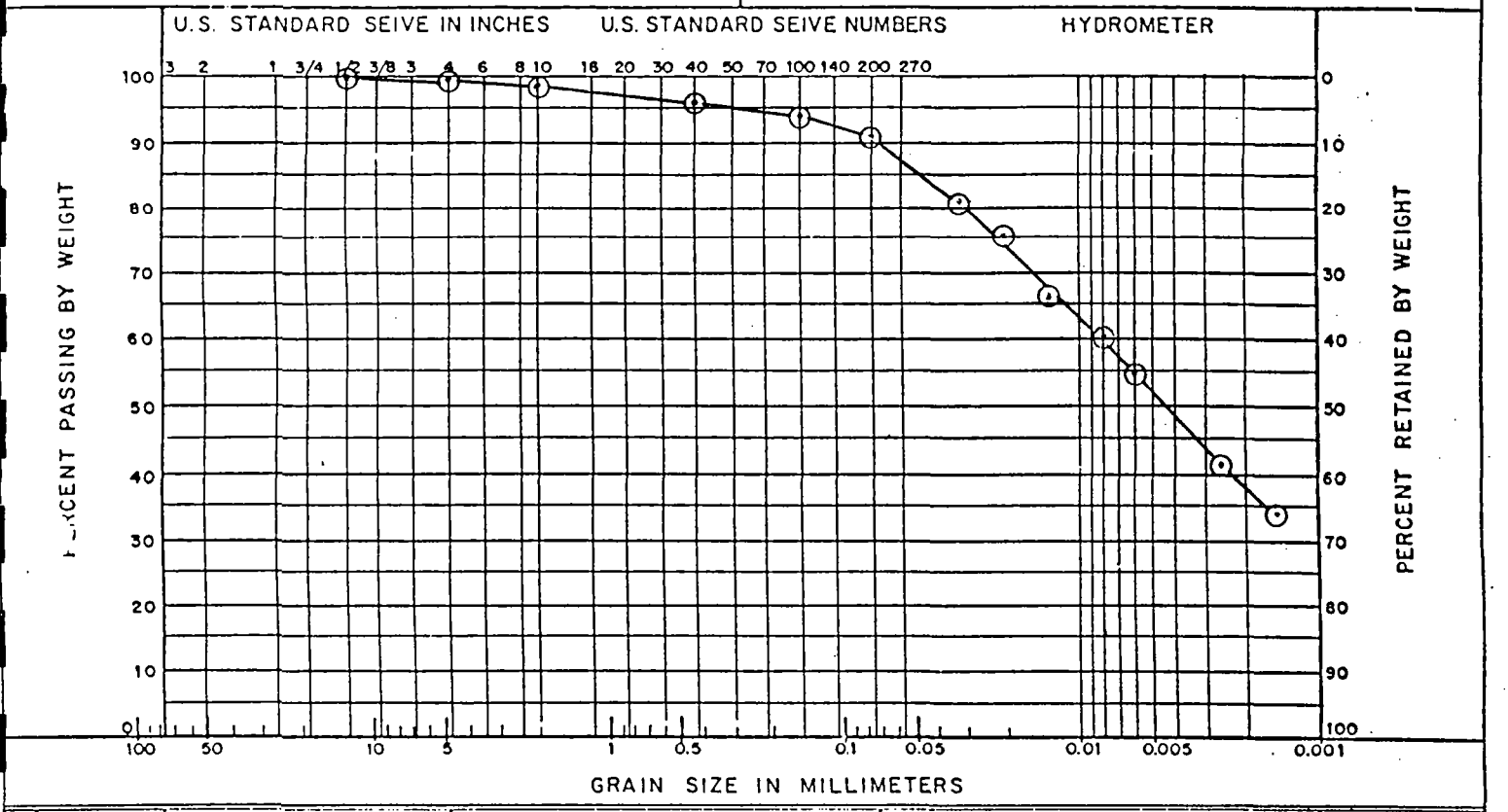
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE				
ASTM	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
			COARSE	MEDIUM	FINE				
AASHO	GRAVEL			SAND		SILT		CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE				

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-8 S. NO. 13 DEPTH FT. 23.0 FILE NO. 220

DESCRIPTION: Gray silty clay (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	1.0
PERCENT OF SAND	=	8.0
PERCENT OF SILT > FINES	=	91.0
PERCENT OF CLAY		

METHOD

ASTM D 422-72 _____

OTHER _____

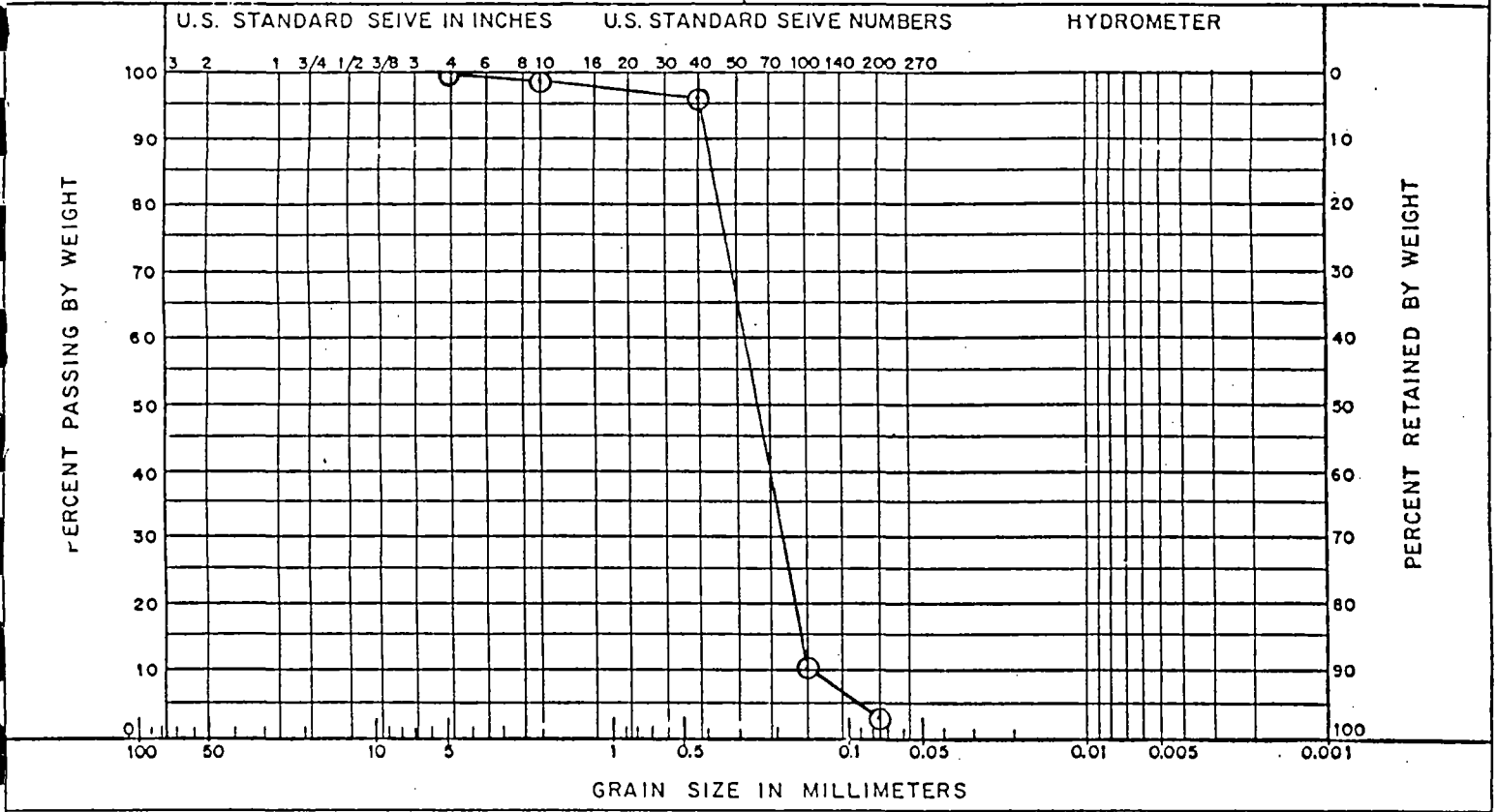
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-9 S. NO. S-3 DEPTH FT. 7.5 FILE NO. 220

DESCRIPTION: Gray, fine to medium sand (SP)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10} = _____

COEFF OF UNIFORMITY, $C_u = D_{60}/D_{10}$ = _____

PERCENT MINUS 0.02 mm = _____

PERCENT OF BOULDERS = _____

PERCENT OF GRAVEL = _____

PERCENT OF SAND = 97.0

PERCENT OF SILT, PERCENT OF CLAY > FINES = 3.0

METHOD

ASTM D 422-72 _____

OTHER _____

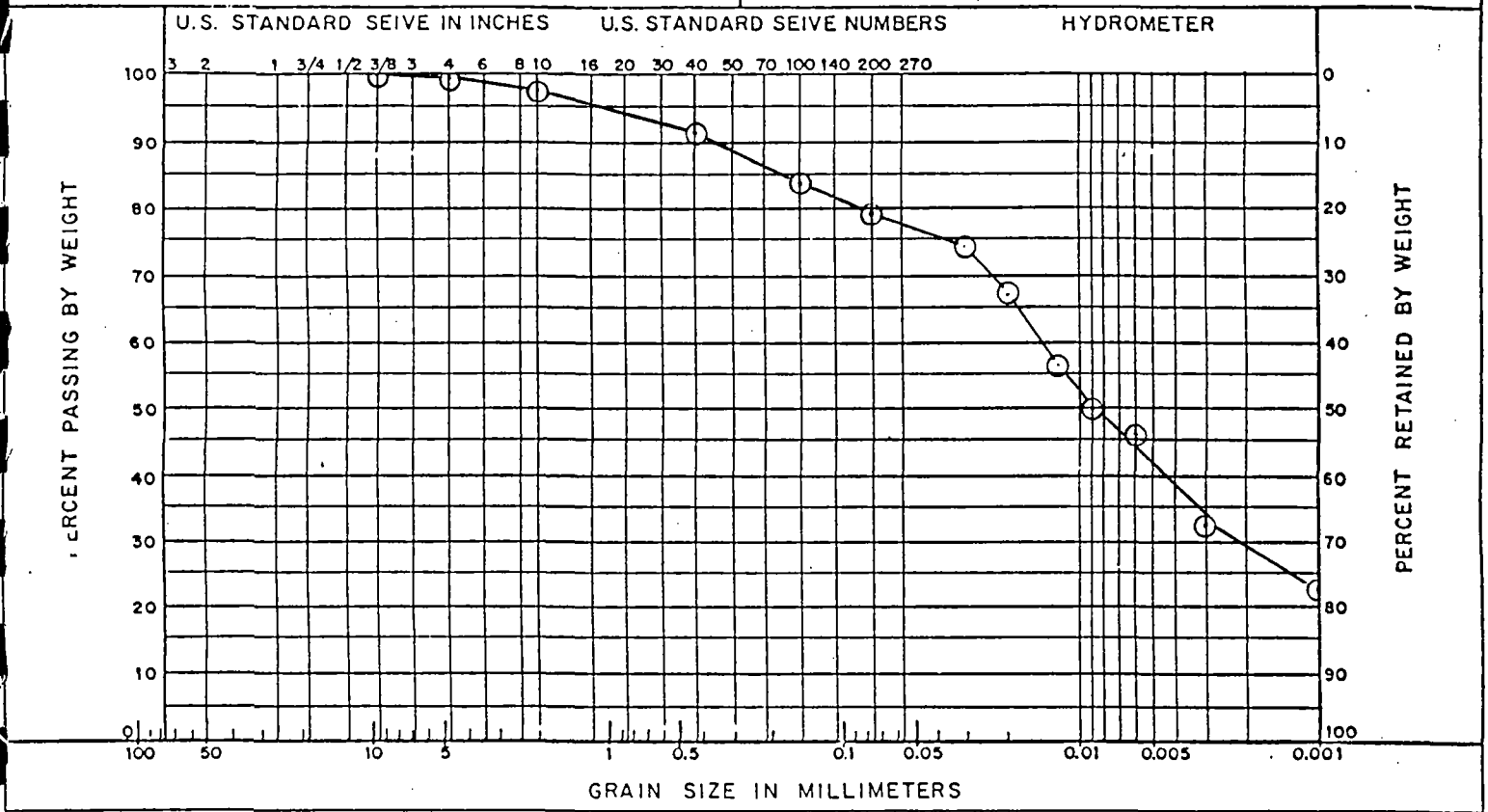
GRAIN SHAPE KEY

A-WELL ROUNDED D-SUBANGULAR G-FLAKE
B-ROUNDED E-ANGULAR H-POROUS
C-SUBROUNDED F-ELONGATED I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE				
ASTM	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
			COARSE	MEDIUM	FINE				
AASHO	GRAVEL			SAND		SILT		CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE				

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-9 S. NO. S-8 DEPTH FT. 17.0-19.0 FILE NO. 220

DESCRIPTION: Gray, silty clay with sand (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	1.0
PERCENT OF SAND	=	19.0
PERCENT OF SILT > FINES	=	80.0
PERCENT OF CLAY		

METHOD

ASTM D 422-72 _____

OTHER _____

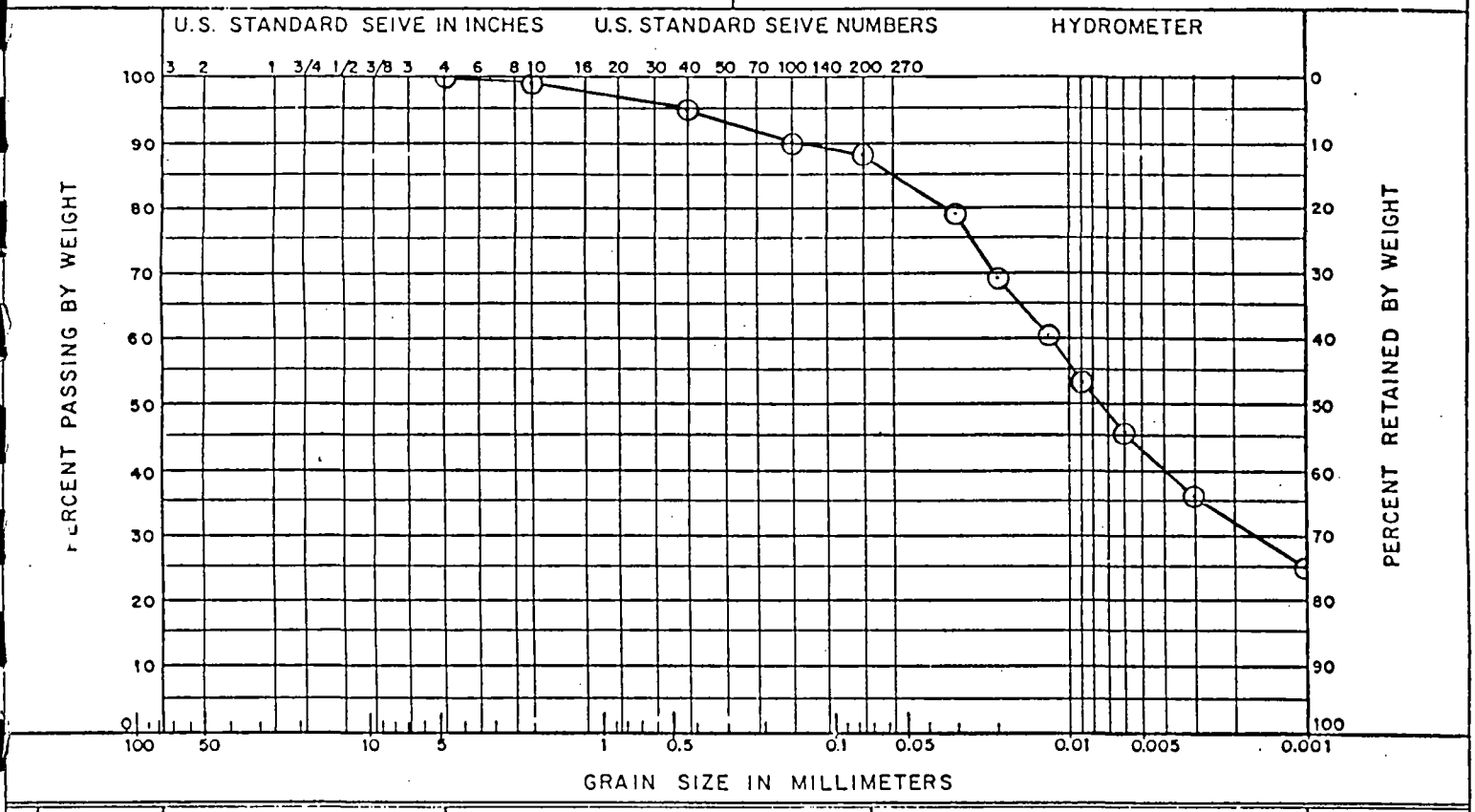
GRAIN SHAPE KEY

A-WELL ROUNDED D-SUBANGULAR G-FLAKE
B-ROUNDED E-ANGULAR H-POROUS
C-SUBROUNDED F-ELONGATED I-_____

REMARKS: Liquid Limit = 28.0
Plastic Limit = 17.0
Plasticity Index = 11.0

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD	GRAVEL			SAND			SILT AND CLAY FINES		COLLOIDS
UNIFIED	COARSE	FINE		COARSE	MEDIUM	FINE			
ASTM	GRAVEL			SAND			SILT AND CLAY FINES		COLLOIDS
				COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND			SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE		FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-9 S. NO. S-10 DEPTH FT. 21.0-23.0 FILE NO. 220

DESCRIPTION: Gray, silty clay with sand (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	
PERCENT OF SAND	=	12.0
PERCENT OF SILT / PERCENT OF CLAY > FINES	=	88.0

METHOD

ASTM D 422-72 _____

OTHER _____

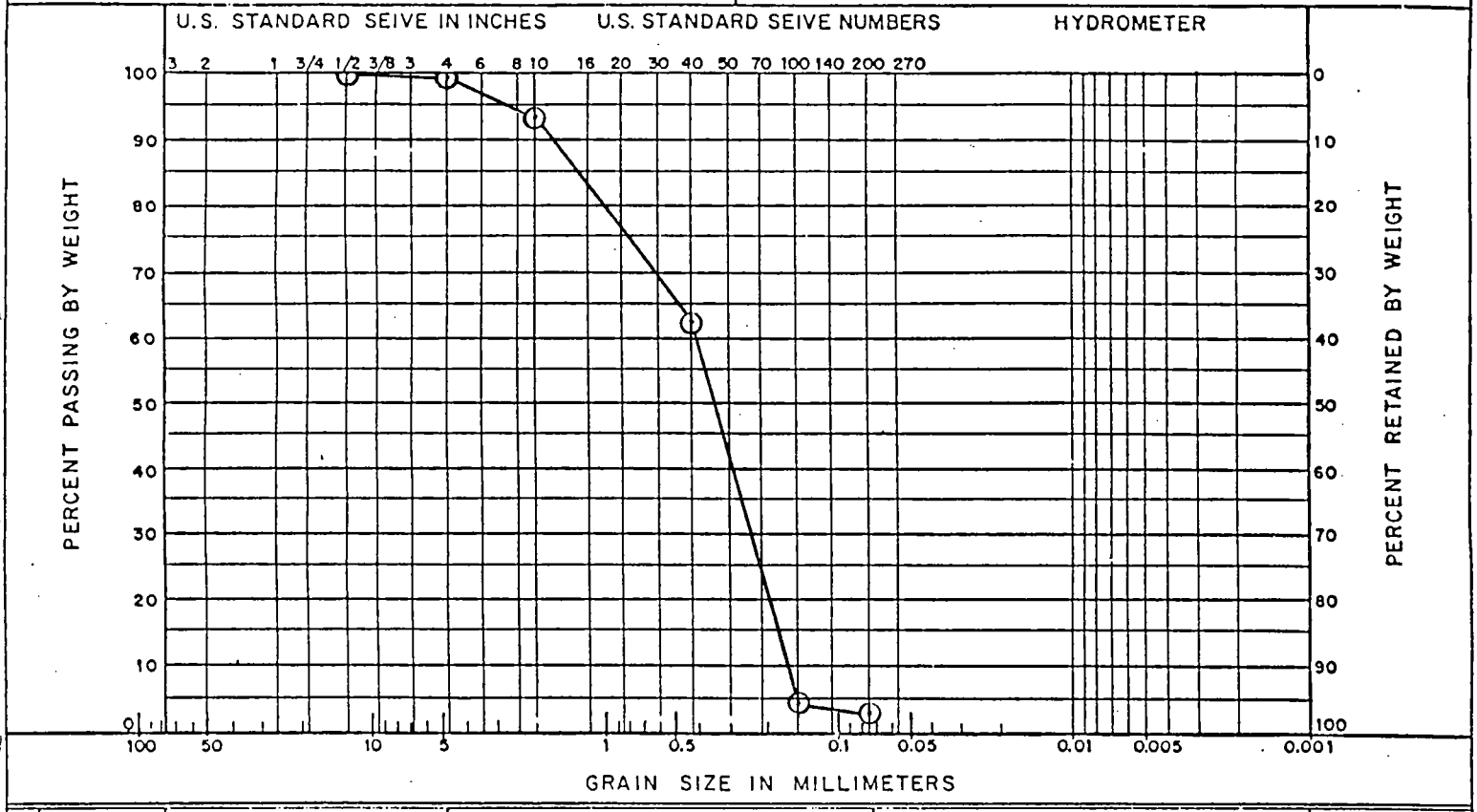
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS: Liquid Limit = 30.0
Plastic Limit = 11.0
Plasticity Index = 19.0

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-9 S. NO. S-11 DEPTH FT. 23.0-25.0 FILE NO. 220

DESCRIPTION: Light gray, fine to coarse sand (SP)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10} = _____

COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$ = _____

PERCENT MINUS 0.02 mm = _____

PERCENT OF BOULDERS = _____

PERCENT OF GRAVEL = 1.0

PERCENT OF SAND = 96.0

PERCENT OF SILT, PERCENT OF CLAY > FINES = 3.0

METHOD

ASTM D 422-72 _____

OTHER _____

GRAIN SHAPE KEY

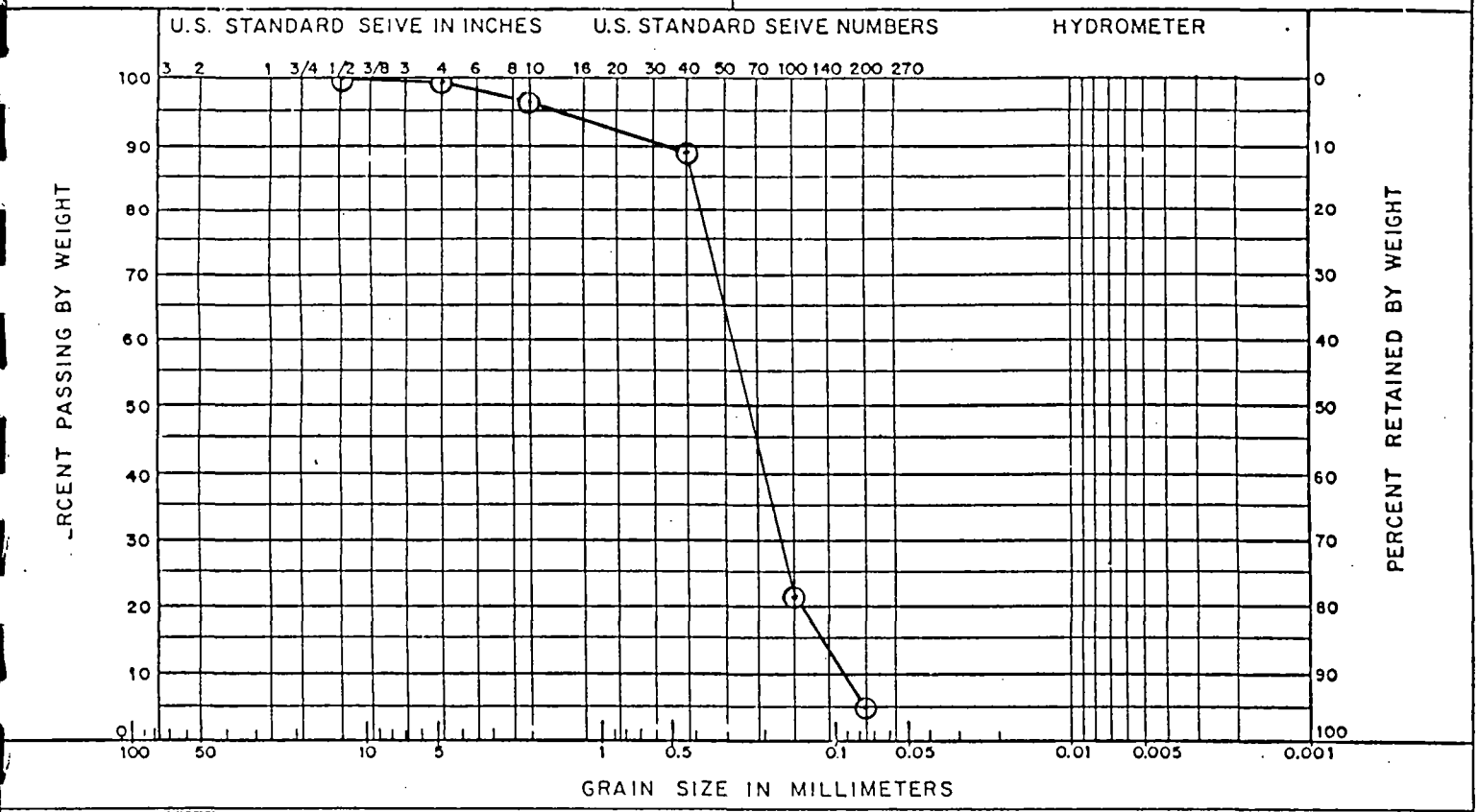
A-WELL ROUNDED D-SUBANGULAR G-FLAKE
B-ROUNDED E-ANGULAR H-POROUS
C-SUBROUNDED F-ELONGATED I-_____

REMARKS _____

EXHIBIT

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-10 S. NO. S-2A DEPTH FT. 9.0-10.0 FILE NO. 20.0

DESCRIPTION: Gray, silty fine to coarse sand (SP-SM)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	1.0
PERCENT OF SAND	=	94.0
PERCENT OF SILT > FINES	=	5.0
PERCENT OF CLAY		

METHOD

ASTM D 422-72 _____

OTHER _____

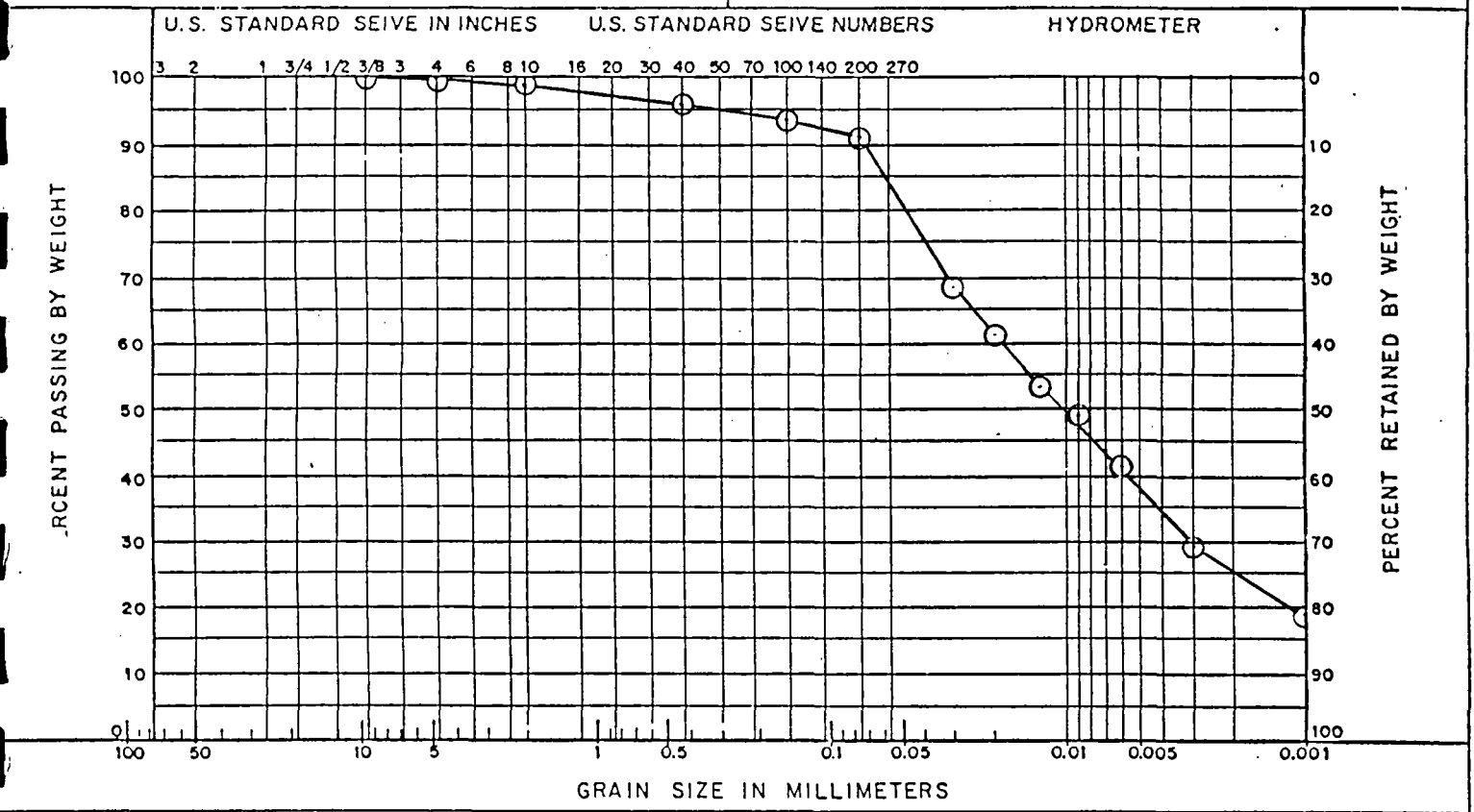
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-10 S. NO. S-7 DEPTH FT. 21.0-23.0 FILE NO. 220

DESCRIPTION: Gray, silty clay (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=
PERCENT MINUS 0.02 mm	=
PERCENT OF BOULDERS	=
PERCENT OF GRAVEL	=
PERCENT OF SAND	= 9.0
PERCENT OF SILT / PERCENT OF CLAY > FINES	= 91.0

METHOD

ASTM D 422-72 _____

OTHER _____

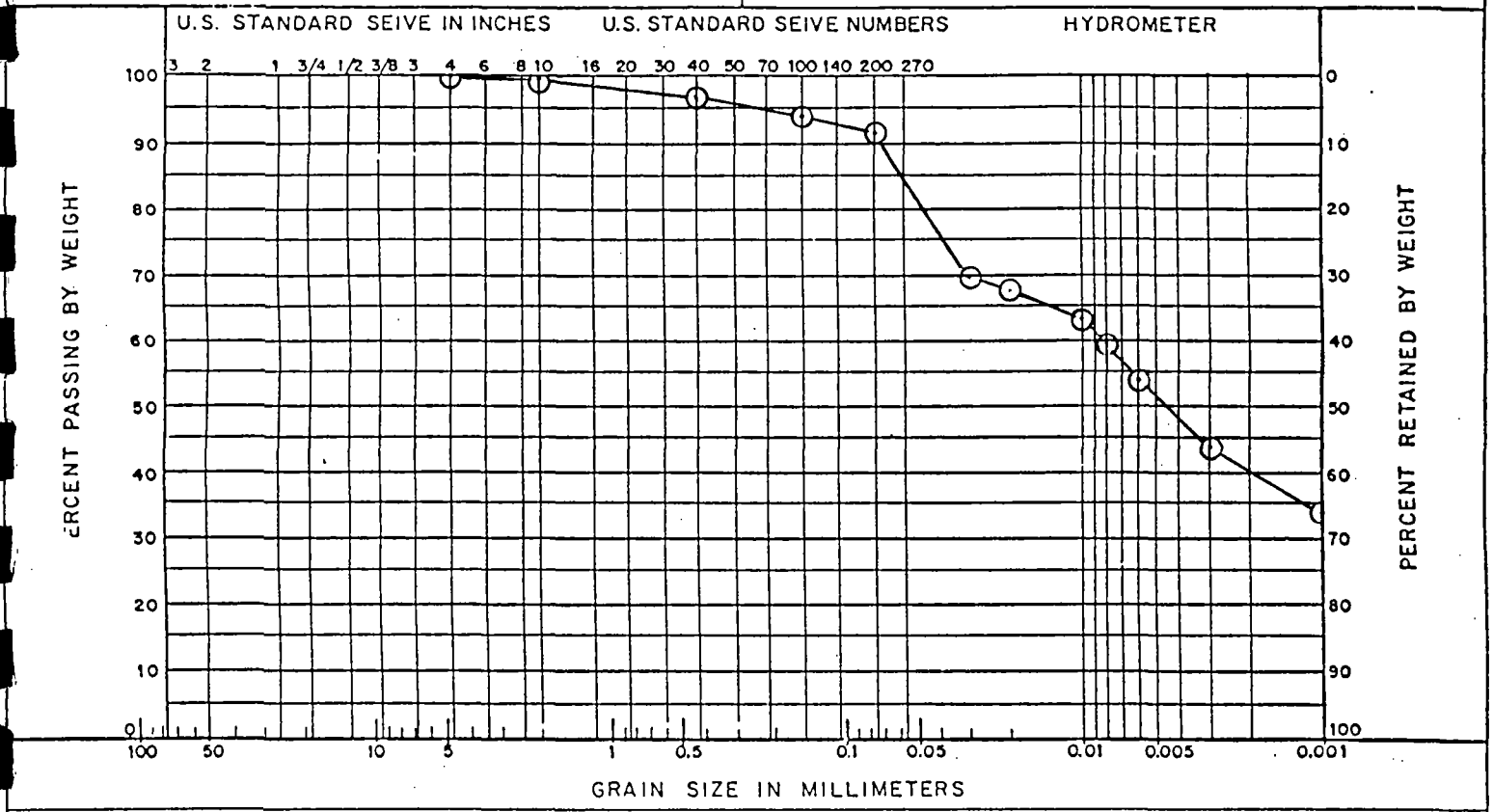
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS: Liquid Limit = 34.0
Plastic Limit = 21.0
Plasticity Index = 13.0

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-10 S. NO. ST-1 DEPTH FT. 25.0-27.0 FILE NO. 220

DESCRIPTION: Gray, silty clay (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10} = _____

COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$ = _____

PERCENT MINUS 0.02 mm = _____

PERCENT OF BOULDERS = _____

PERCENT OF GRAVEL = _____

PERCENT OF SAND = 8.0

PERCENT OF SILT, PERCENT OF CLAY > FINES = 92.0

METHOD

ASTM D 422-72 _____

OTHER _____

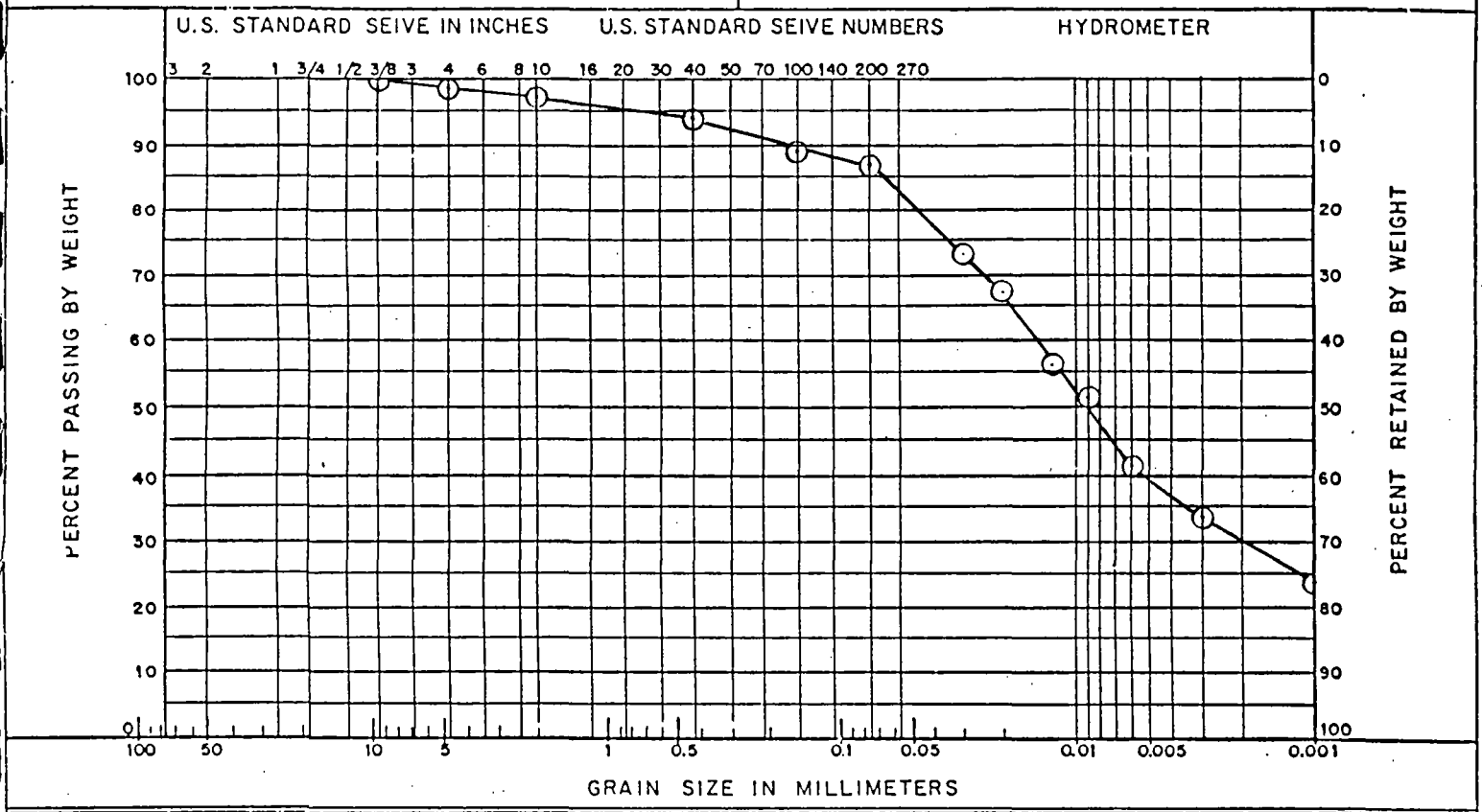
GRAIN SHAPE KEY

A-WELL ROUNDED D-SUBANGULAR G-FLAKE
B-ROUNDED E-ANGULAR H-POROUS
C-SUBROUNDED F-ELONGATED I-_____

REMARKS: Liquid Limit = 33.0
Plastic Limit = 15.0
Plasticity Index = 18.0

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-10 S. NO. S-11B DEPTH FT. 30.5-31.0 FILE NO. 220

DESCRIPTION: Gray, silty clay (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	2.0
PERCENT OF SAND	=	11.0
PERCENT OF SILT > FINES	=	87.0
PERCENT OF CLAY		

METHOD

ASTM D 422-72 _____

OTHER _____

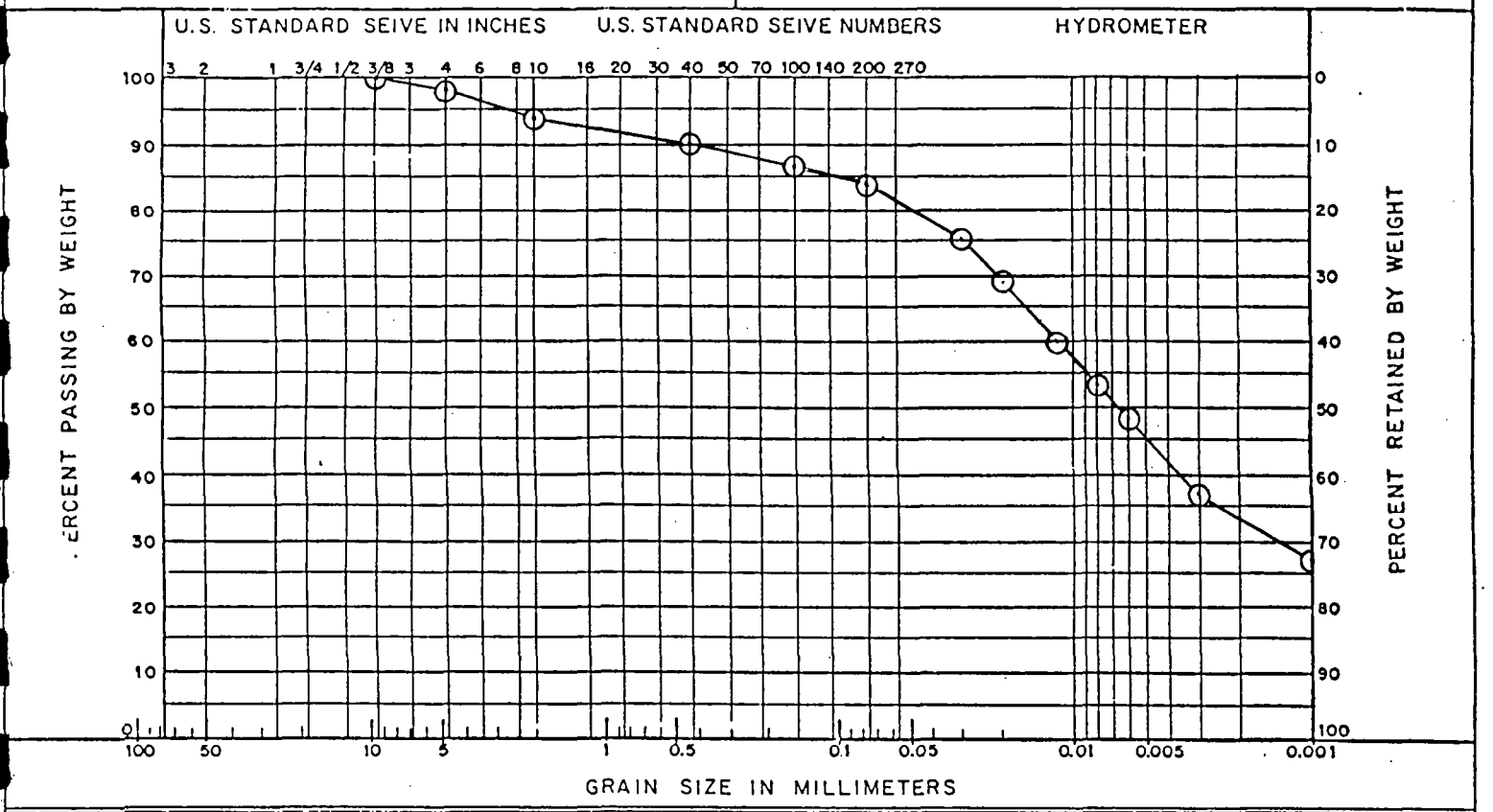
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS: Liquid Limit = 30.0
Plastic Limit = 17.0
Plasticity Index = 13.0

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL: COARSE	GRAVEL: FINE	SAND: COARSE	SAND: MEDIUM	SAND: FINE	SILT AND CLAY FINES			COLLOIDS
ASTM	GRAVEL		SAND: COARSE	SAND: MEDIUM	SAND: FINE	SILT AND CLAY FINES			COLLOIDS
AASHO	GRAVEL: COARSE	GRAVEL: MEDIUM	GRAVEL: FINE	SAND: COARSE	SAND: FINE	SILT		CLAY	COLLOIDS

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-5 S. NO. S-9 DEPTH FT. 19.0-20.0' FILE NO. 220

DESCRIPTION: Gray, silty clay with sand, trace fine gravel (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	2.0
PERCENT OF SAND	=	14.0
PERCENT OF SILT / PERCENT OF CLAY > FINES	=	84.0

METHOD

ASTM D 422-72 _____

OTHER _____

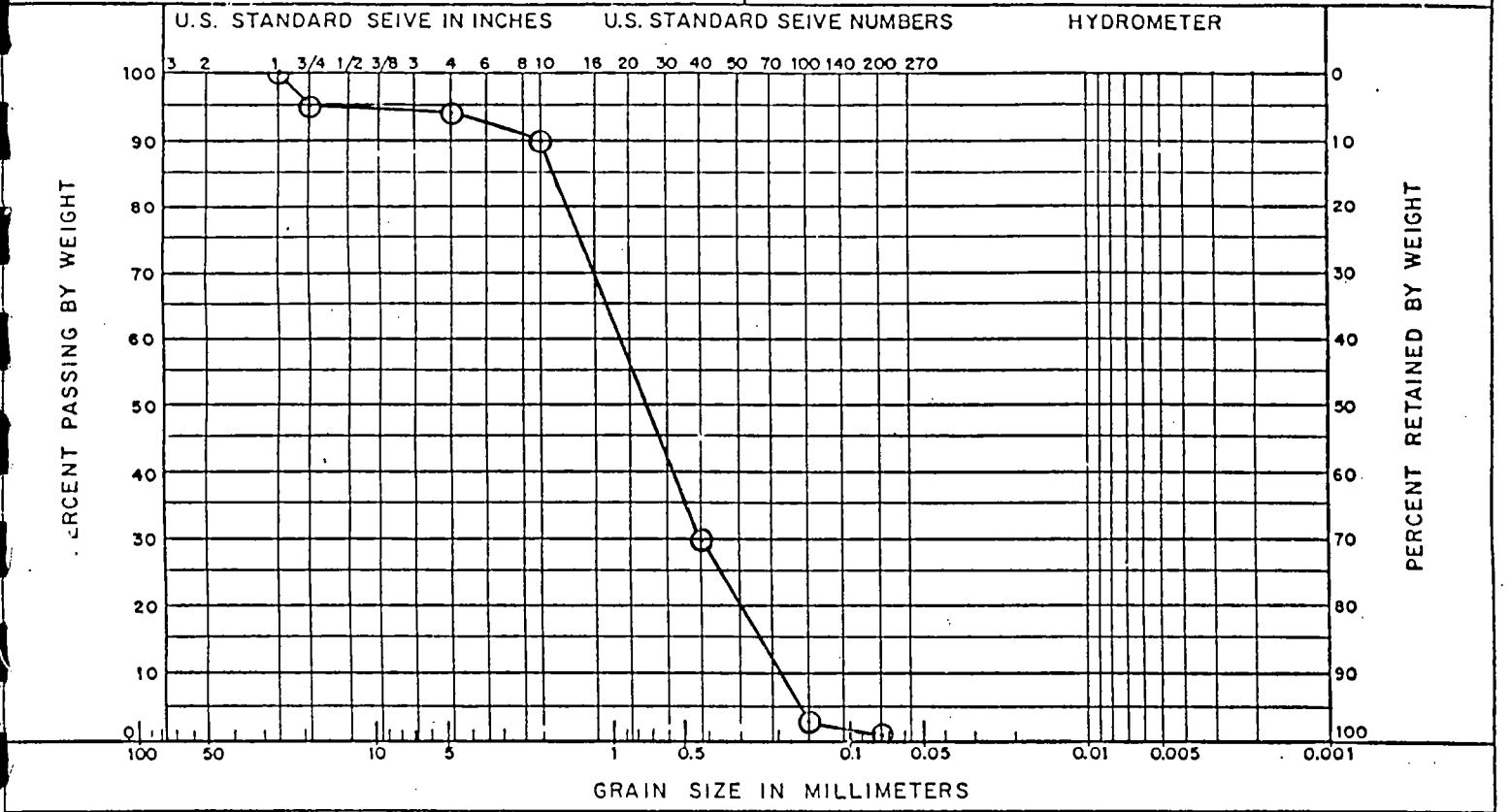
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS: Liquid Limit = 31.0
Plastic Limit = 12.0
Plasticity Index = 19.0

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. SB-10 S. NO. S-17A DEPTH FT. 42.0-43.0 FILE NO. 220

DESCRIPTION: Gray, fine to coarse sand, trace fine gravel (SP)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	6.0
PERCENT OF SAND	=	93.0
PERCENT OF SILT, PERCENT OF CLAY > FINES	=	1.0

METHOD

ASTM D 422-72 _____

OTHER _____

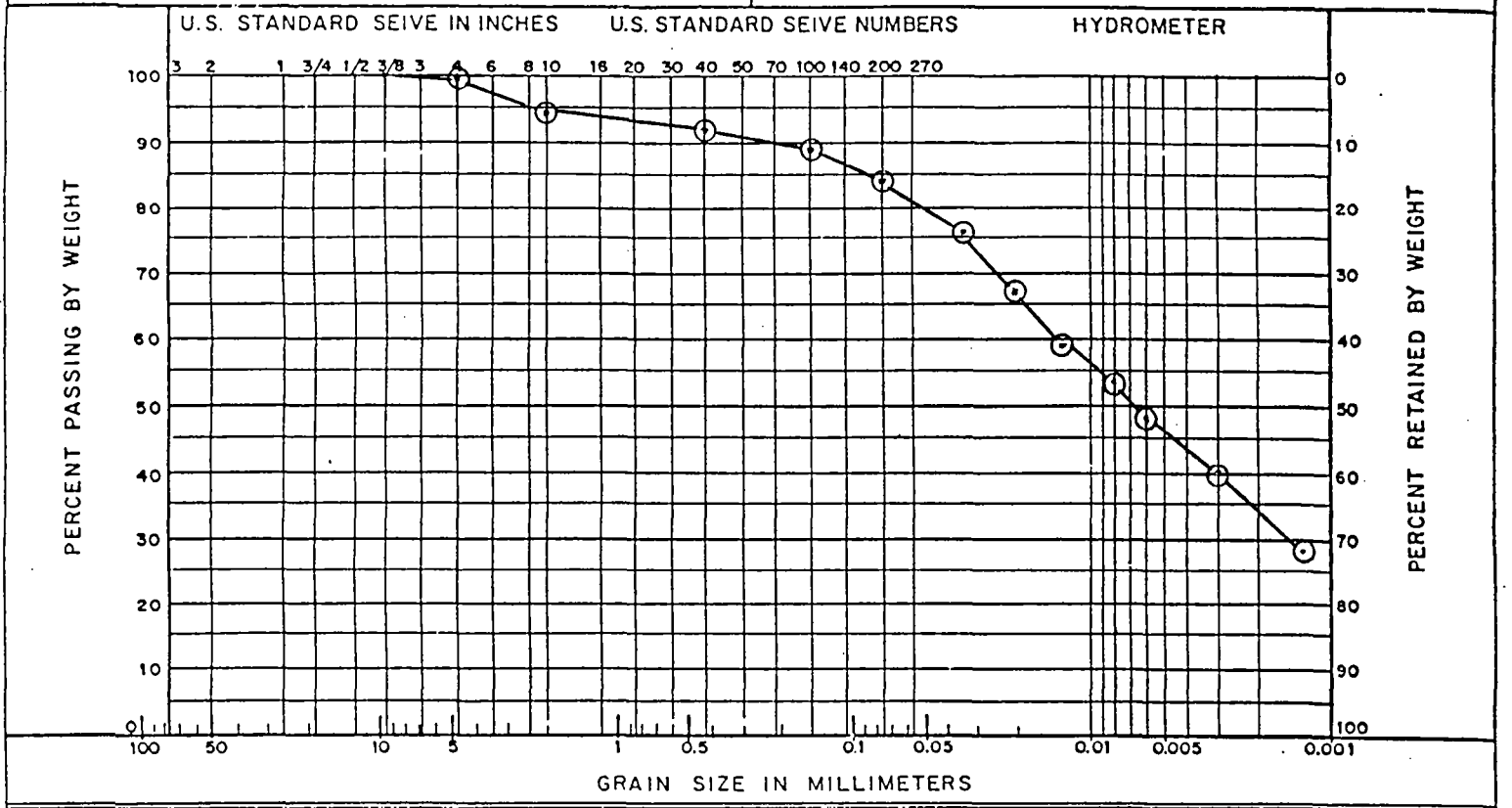
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE				
ASTM	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
			COARSE	MEDIUM	FINE				
AASHO	GRAVEL			SAND		SILT		CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE				

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-1 S. NO. 10&11 DEPTH FT. 25.5 FILE NO. 220

DESCRIPTION: Gray silty & sandy clay (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10} = _____

COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$ = _____

PERCENT MINUS 0.02 mm = _____

PERCENT OF BOULDERS = _____

PERCENT OF GRAVEL = _____

PERCENT OF SAND = 17.0

PERCENT OF SILT > FINES = 83.0

PERCENT OF CLAY

METHOD

ASTM D 422-72 _____

OTHER _____

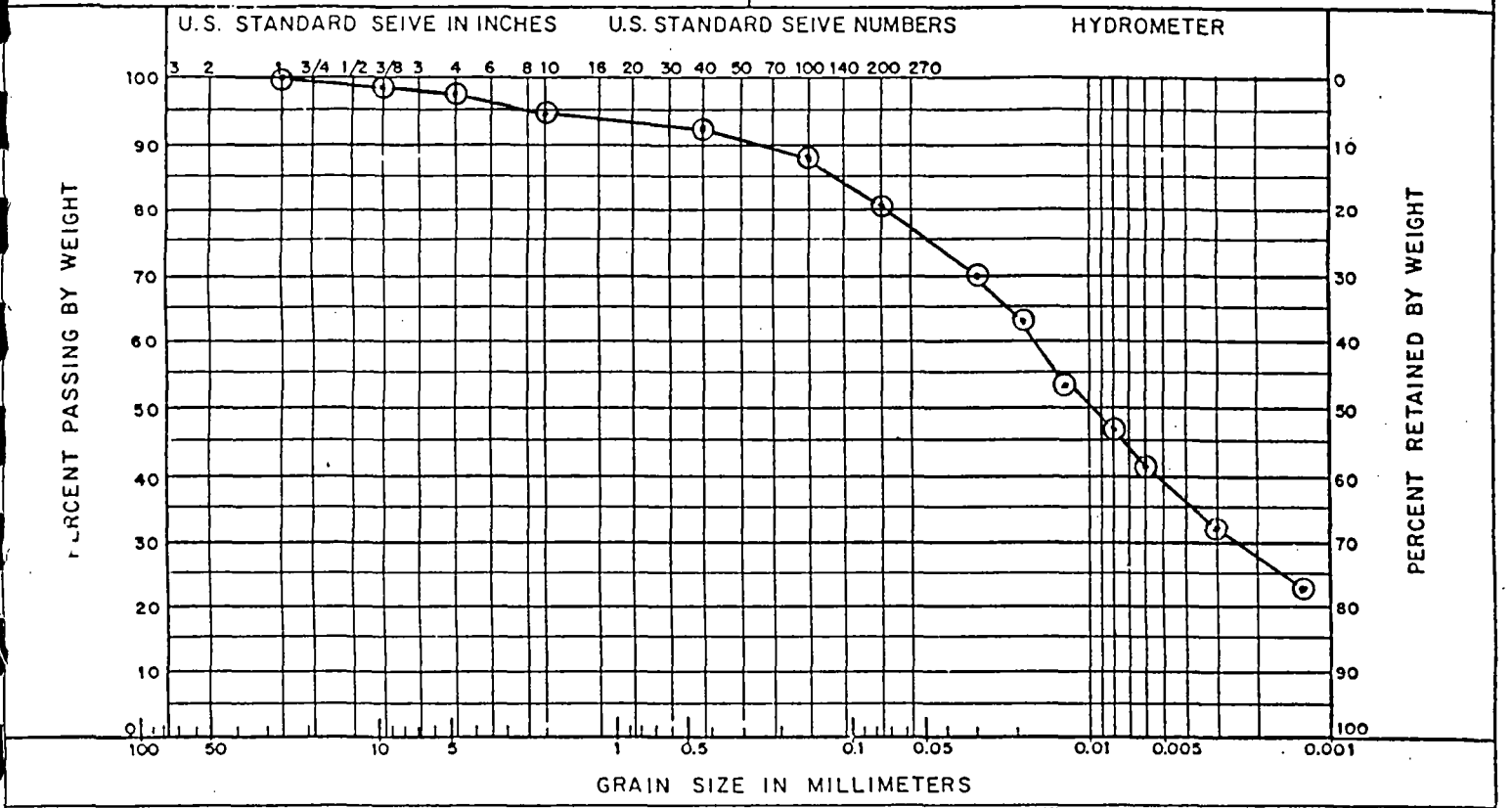
GRAIN SHAPE KEY

A-WELL ROUNDED D-SUBANGULAR G-FLAKE
B-ROUNDED E-ANGULAR H-POROUS
C-SUBROUNDED F-ELONGATED I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-1 S. NO. 21 DEPTH FT. 44.5 FILE NO. 220

DESCRIPTION: Gray silty & sandy clay, trace gravel (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	3.0
PERCENT OF SAND	=	17.0
PERCENT OF SILT > FINES	=	80.0
PERCENT OF CLAY		

METHOD

ASTM D 422-72 _____

OTHER _____

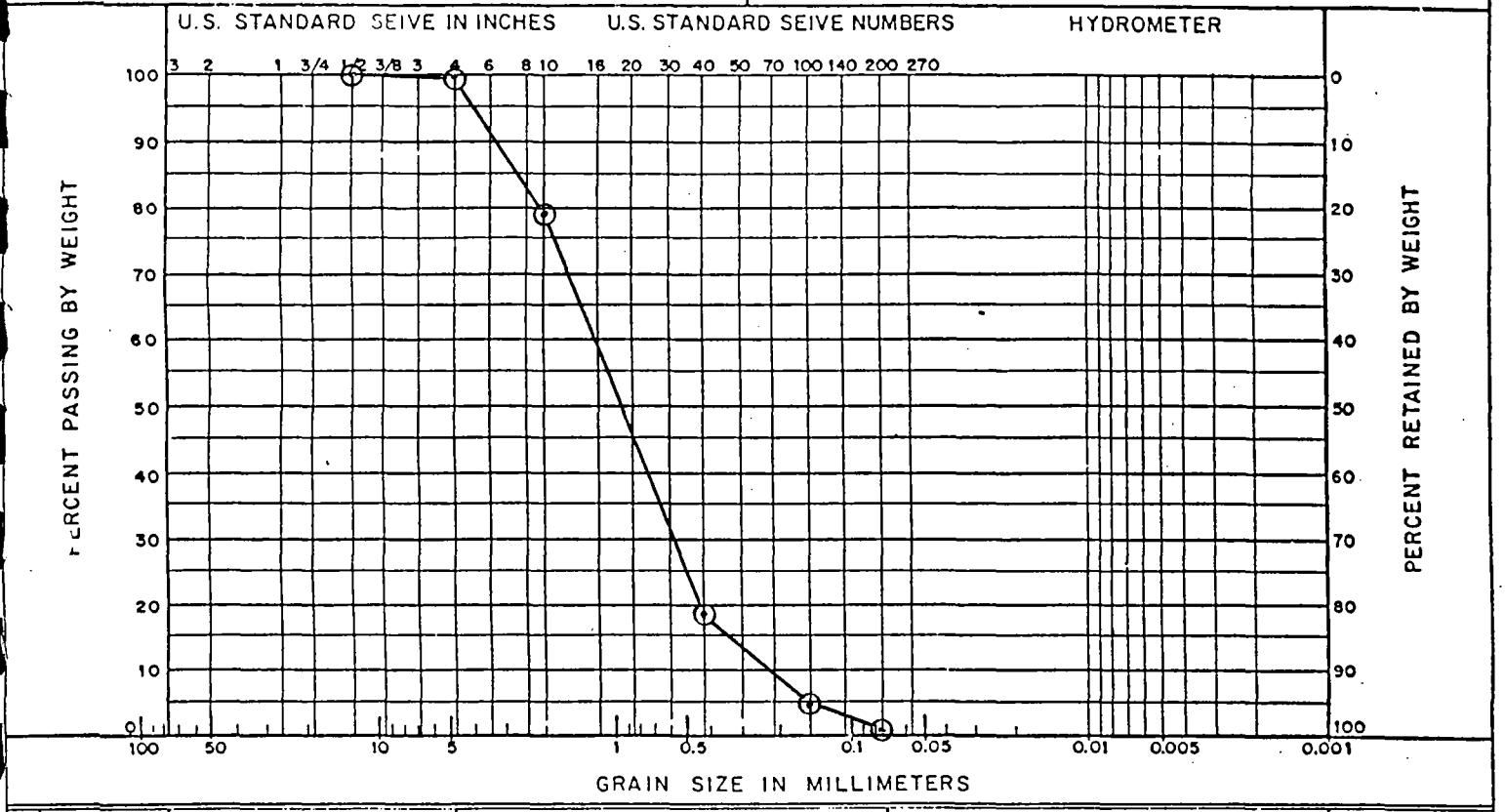
GRAIN SHAPE KEY

A-WELL ROUNDED D-SUBANGULAR G-FLAKE
B-ROUNDED E-ANGULAR H-POROUS
C-SUBROUNDED F-ELONGATED I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-1 S. NO. 22 DEPTH FT. 47.5 FILE NO. 220

DESCRIPTION: Gray fine to coarse sand, well-graded (SW)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	
PERCENT OF SAND	=	99.0
PERCENT OF SILT > FINES	=	1.0
PERCENT OF CLAY		

METHOD

ASTM D 422-72 _____

OTHER _____

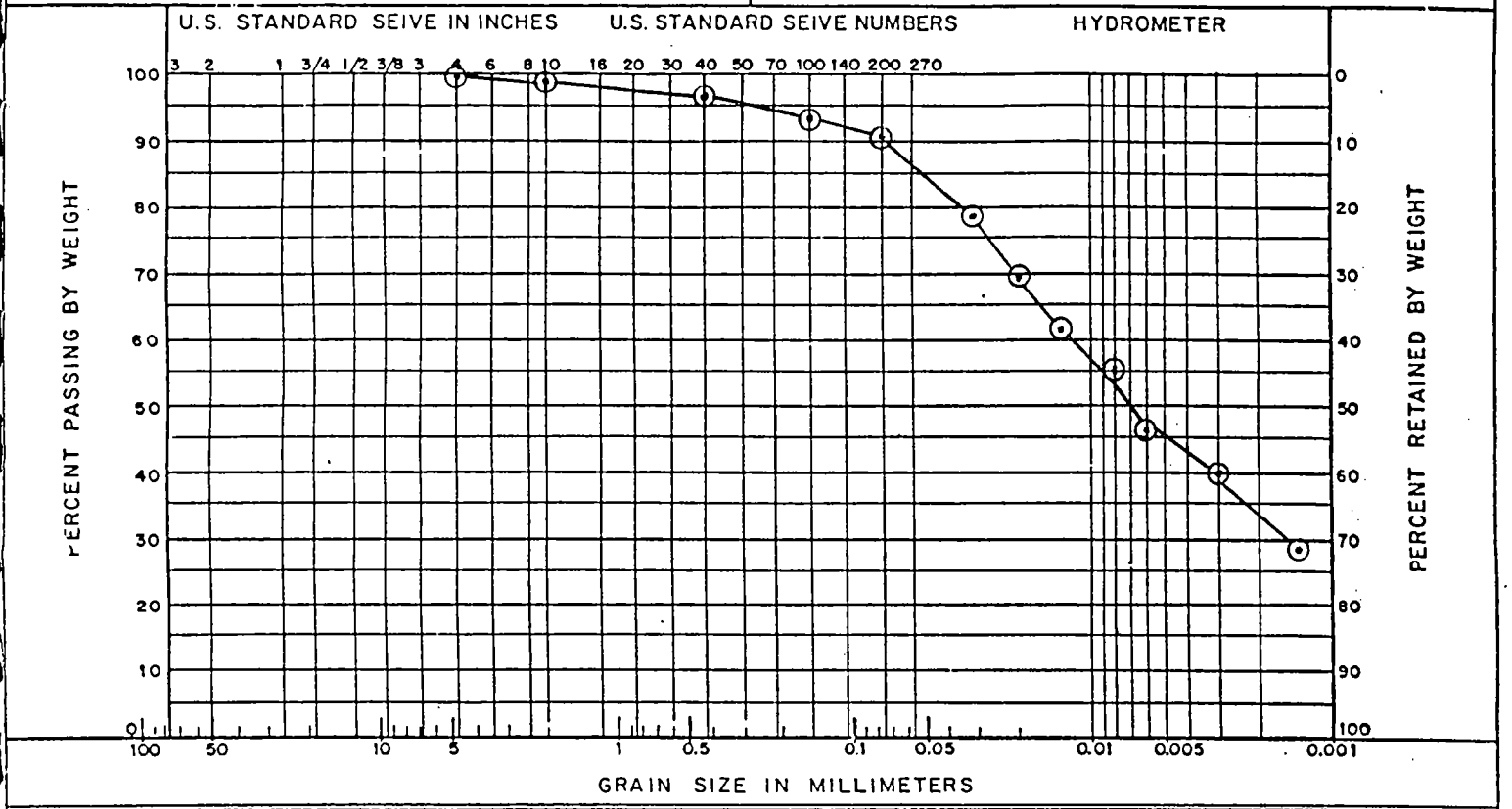
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B.NO. M-2 S.NO. 12 DEPTH FT. 30.0 FILE NO. 220

DESCRIPTION: Gray silty clay, trace sand (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	
PERCENT OF SAND	=	9.0
PERCENT OF SILT > FINES	=	91.0
PERCENT OF CLAY > FINES		

METHOD

ASTM D 422-72 _____

OTHER _____

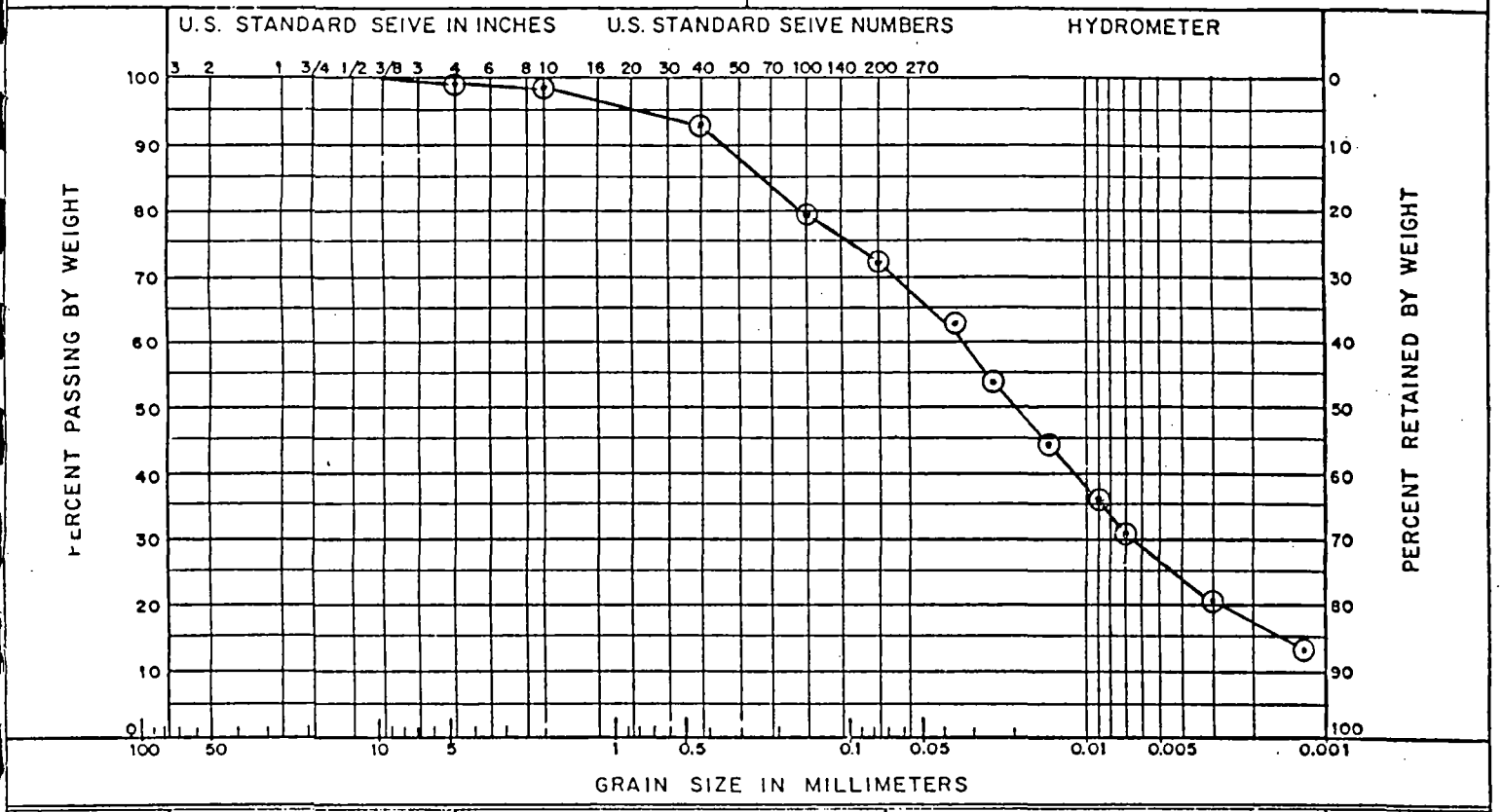
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE				
ASTM	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
			COARSE	MEDIUM	FINE				
AASHO	GRAVEL			SAND		SILT		CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE				

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-3 S. NO. 7 DEPTH FT. 17.0 FILE NO. 220

DESCRIPTION: Gray silty & sandy clay or sandy & clayey silt (CL-ML)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	1.0
PERCENT OF SAND	=	27.0
PERCENT OF SILT > FINES	=	72.0
PERCENT OF CLAY		

METHOD

ASTM D 422-72 _____

OTHER _____

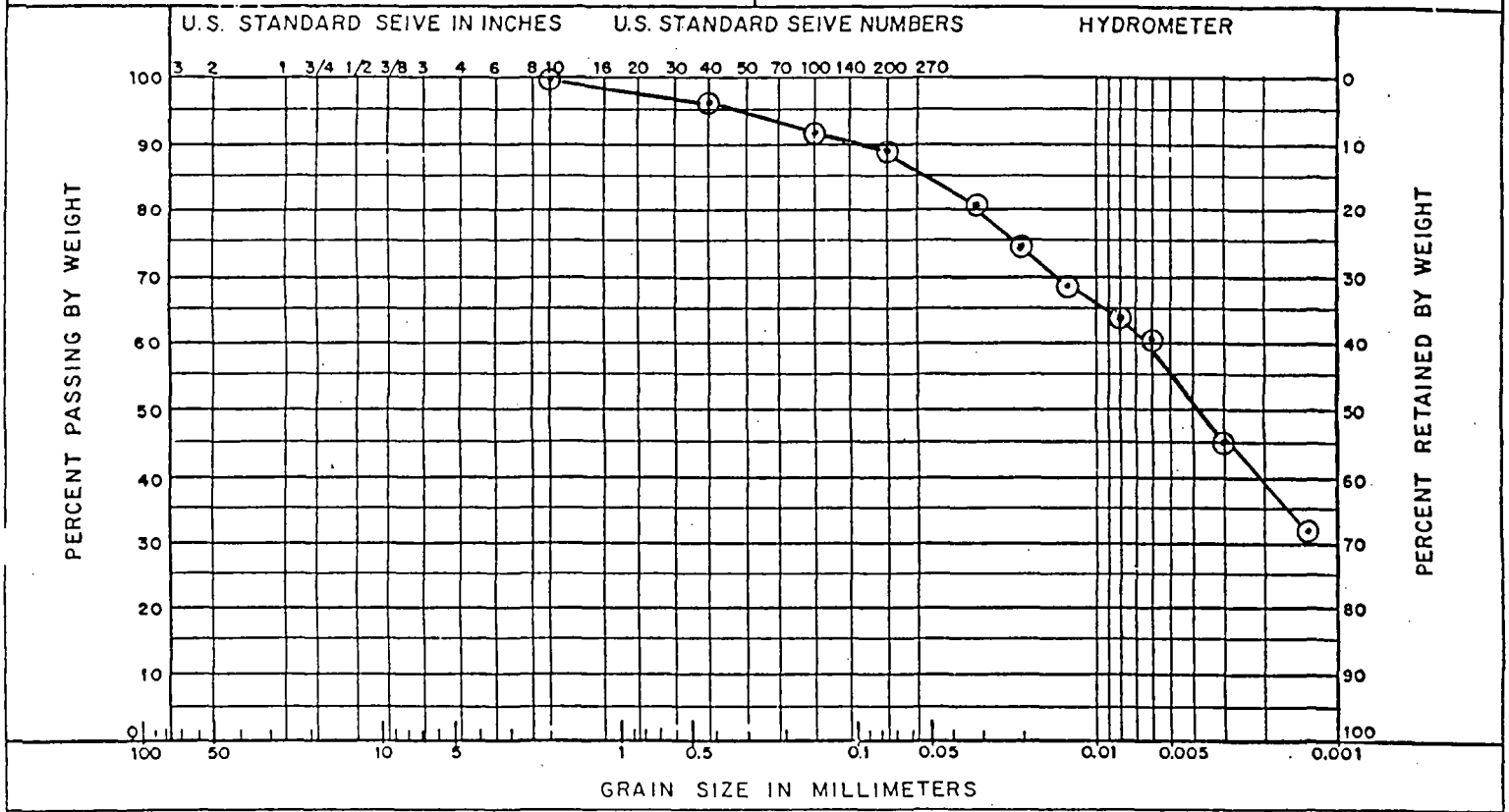
GRAIN SHAPE KEY

A-WELL ROUNDED D-SUBANGULAR G-FLAKE
B-ROUNDED E-ANGULAR H-POROUS
C-SUBROUNDED F-ELONGATED I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-4 S. NO. 5&6 DEPTH FT. 15.0 FILE NO. 220

DESCRIPTION: Gray silty clay, trace sand (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	
PERCENT OF SAND	=	11.0
PERCENT OF SILT > FINES	=	89.0
PERCENT OF CLAY > FINES		

METHOD

ASTM D 422-72 _____

OTHER _____

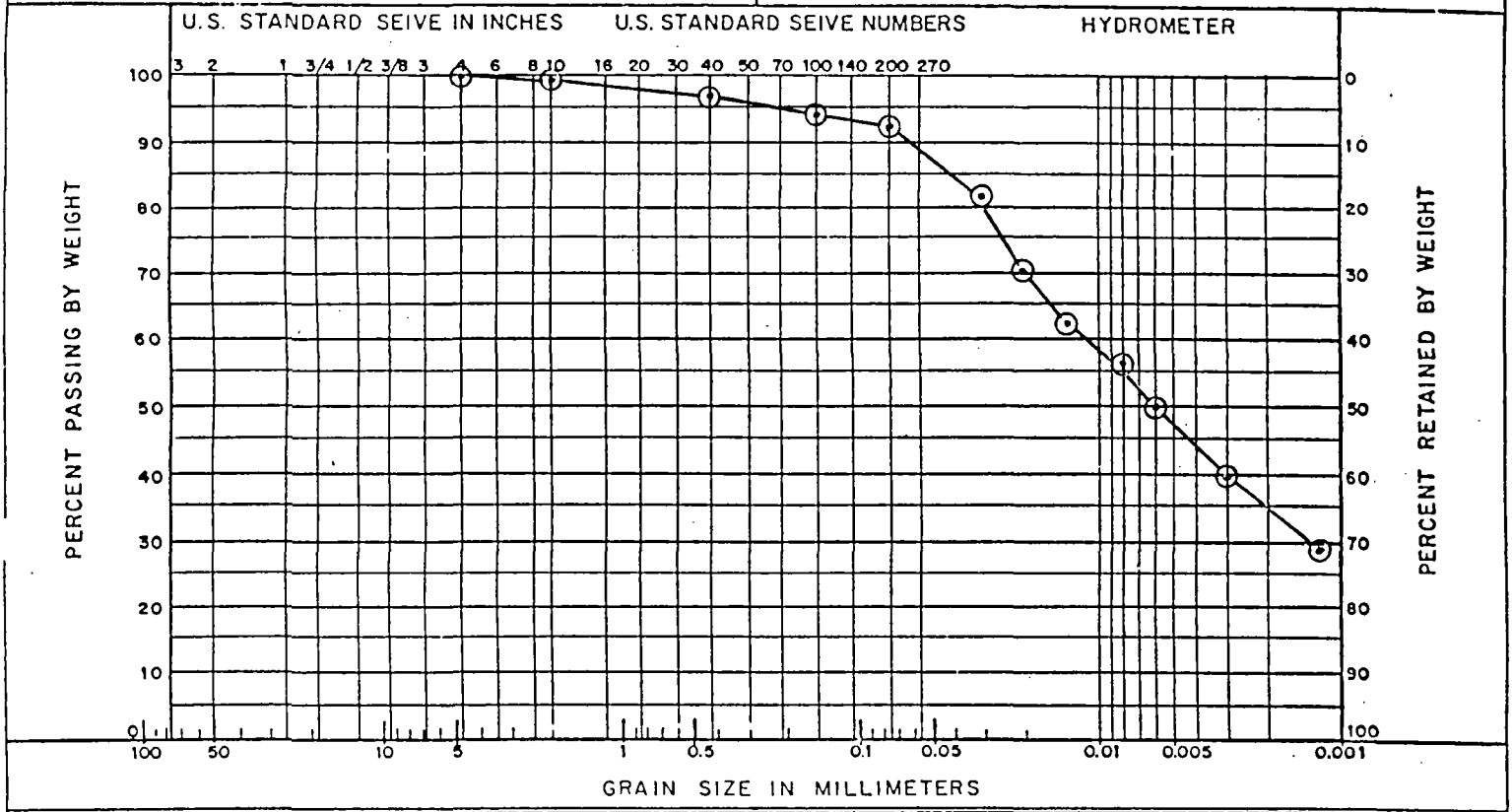
GRAIN SHAPE KEY

A - WELL ROUNDED	D - SUBANGULAR	G - FLAKE
B - ROUNDED	E - ANGULAR	H - POROUS
C - SUBROUNDED	F - ELONGATED	I - _____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE				
ASTM	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
			COARSE	MEDIUM	FINE				
AASHO	GRAVEL			SAND		SILT		CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE				

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-4 S. NO. 7 DEPTH FT. 16.5 FILE NO. 220

DESCRIPTION: Gray silty clay, trace sand (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10} = _____

COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$ = _____

PERCENT MINUS 0.02 mm = _____

PERCENT OF BOULDERS = _____

PERCENT OF GRAVEL = _____

PERCENT OF SAND = 8.0

PERCENT OF SILT, PERCENT OF CLAY > FINES = 92.0

METHOD

ASTM D 422-72 _____

OTHER _____

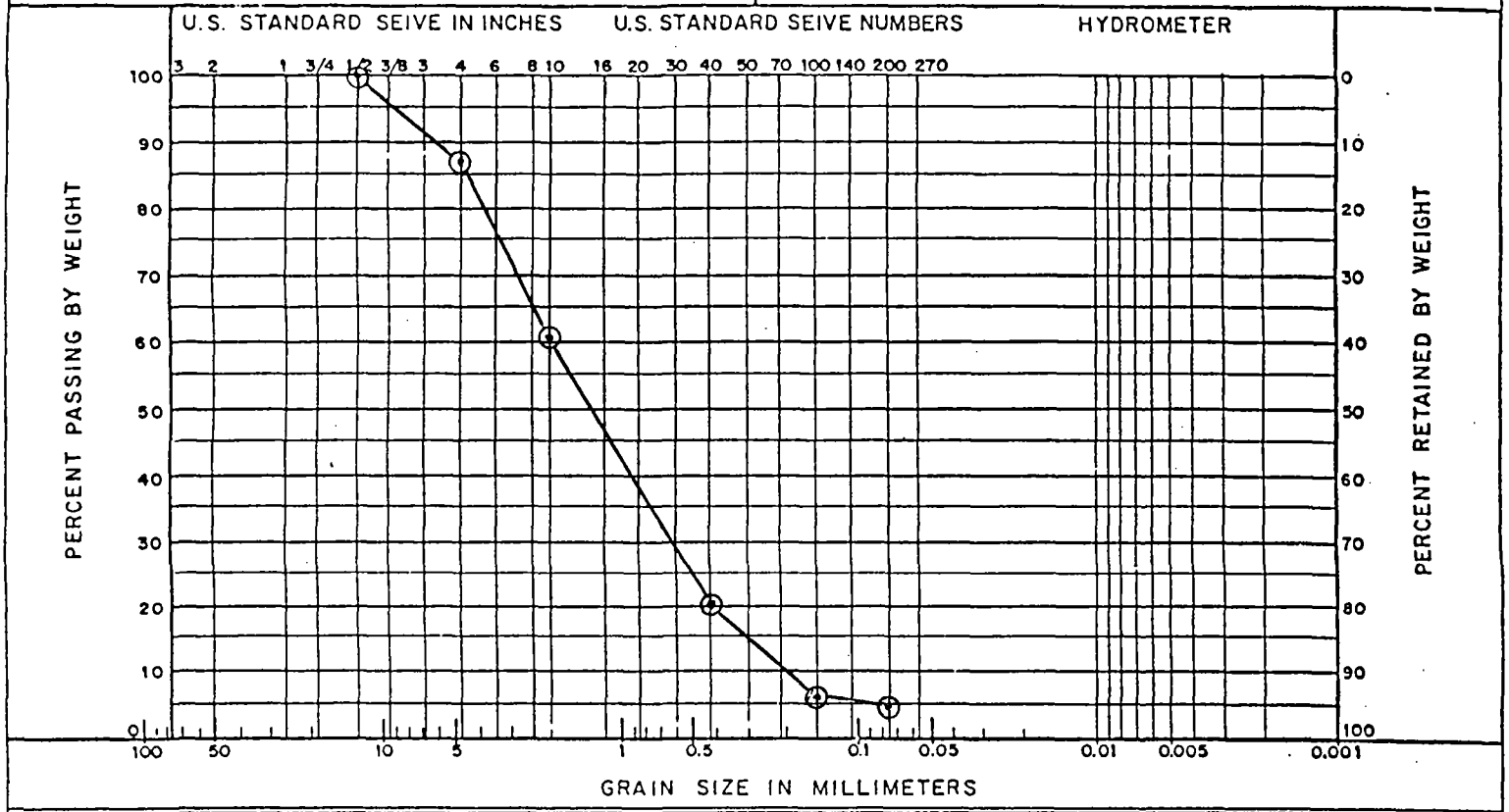
GRAIN SHAPE KEY

A-WELL ROUNDED D-SUBANGULAR G-FLAKE
B-ROUNDED E-ANGULAR H-POROUS
C-SUBROUNDED F-ELONGATED I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-4 S. NO. 22 DEPTH FT. 47.0 FILE NO. 220

DESCRIPTION: Gray fine to coarse gravely sand (SW)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	13.0
PERCENT OF SAND	=	82.0
PERCENT OF SILT / PERCENT OF CLAY > FINES	=	5.0

METHOD

ASTM D 422-72 _____

OTHER _____

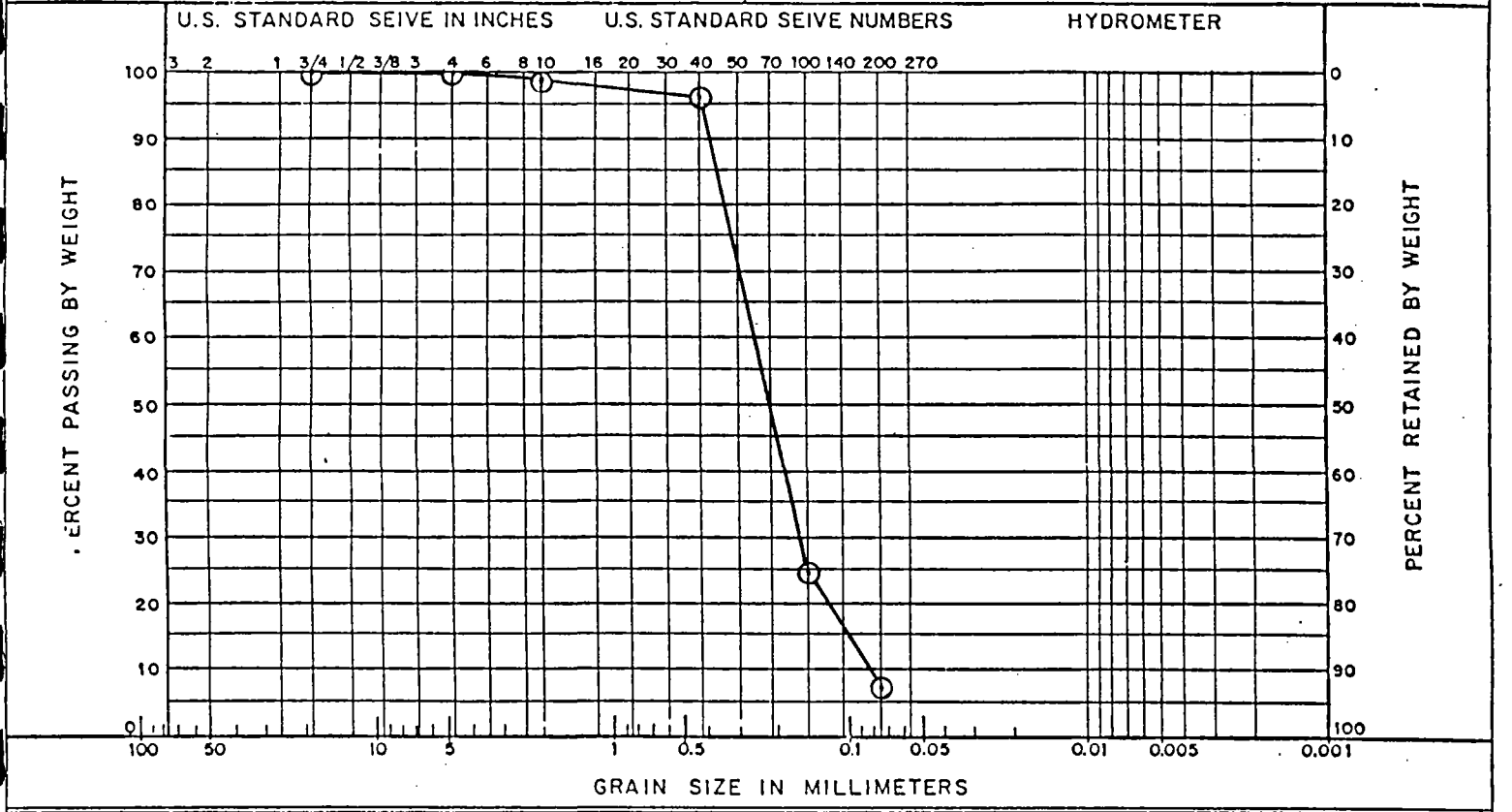
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-5 S. NO. S-4 DEPTH FT. 10.0 FILE NO. 220

DESCRIPTION: Gray, silty fine to medium sand (SP-SM)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	1.0
PERCENT OF SAND	=	92.0
PERCENT OF SILT / PERCENT OF CLAY > FINES	=	7.0

METHOD

ASTM D 422-72 _____

OTHER _____

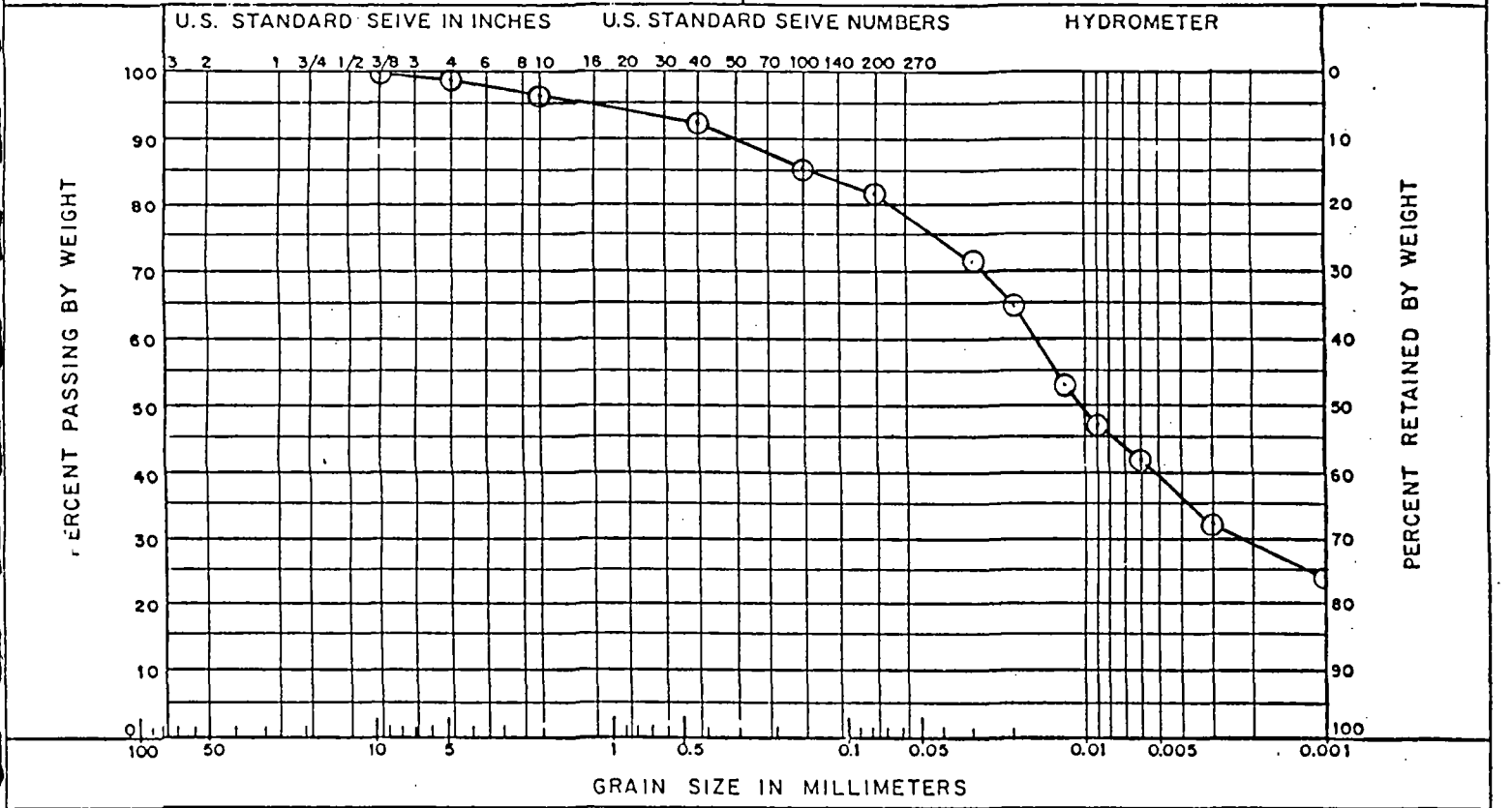
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE				
ASTM	GRAVEL		SAND			SILT AND CLAY FINES			COLLOIDS
			COARSE	MEDIUM	FINE				
AASHO	GRAVEL			SAND		SILT		CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE				

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-5 S. NO. S-6 DEPTH FT. 15.0 FILE NO. 220

DESCRIPTION: Gray, silty clay with sand, trace fine gravel (CL)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	2.0
PERCENT OF SAND	=	17.0
PERCENT OF SILT > FINES	=	81.0
PERCENT OF CLAY		

METHOD

ASTM D 422-72 _____

OTHER _____

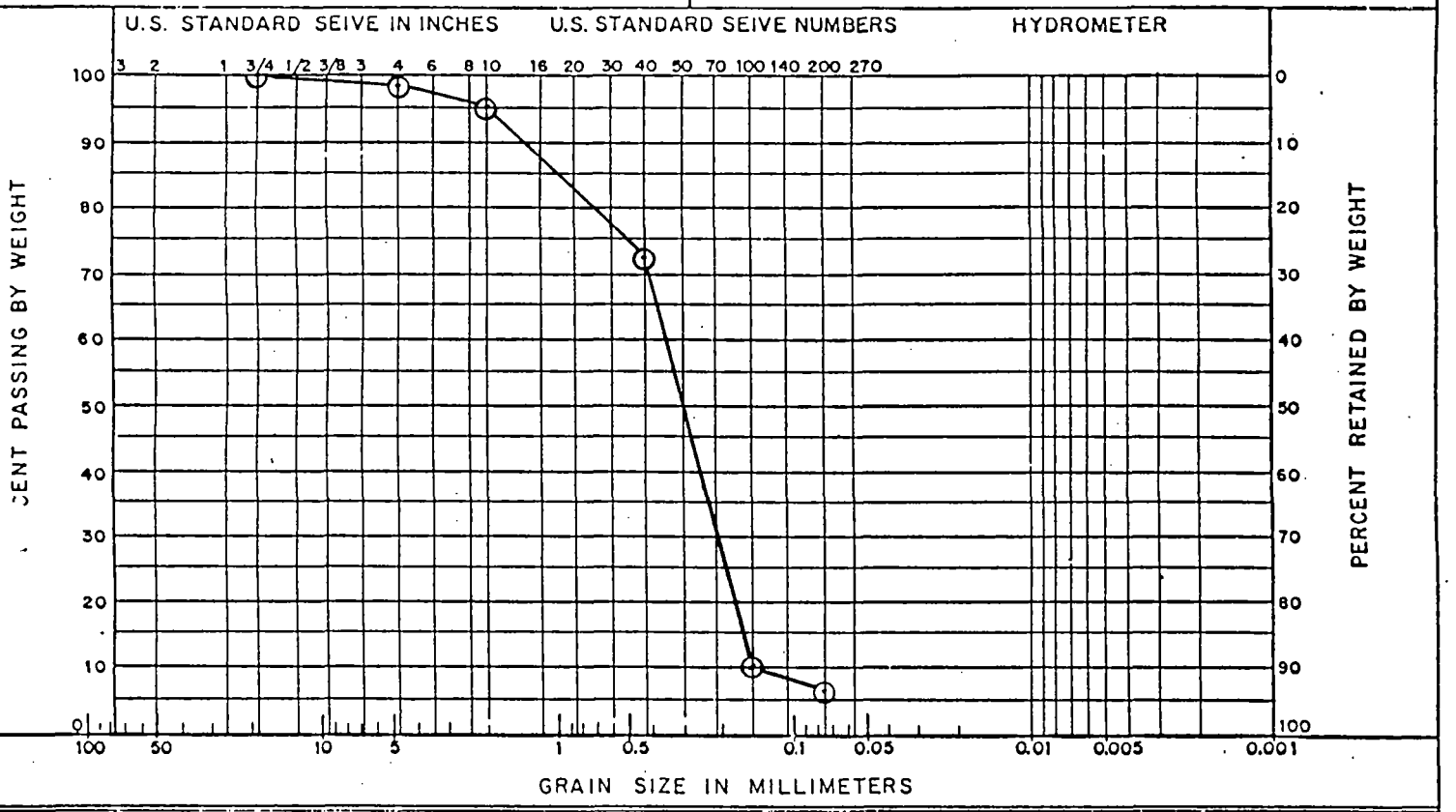
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS: Liquid Limit = 28.0
Plastic Limit = 10.0
Plasticity Index = 18.0

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-5 S. NO. S-12 DEPTH FT. 25.0-27.0 FILE NO. 220

DESCRIPTION: Gray, fine to coarse sand, trace fine gravel (SP-SM)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	2.0
PERCENT OF SAND	=	92.0
PERCENT OF SILT > FINES	=	
PERCENT OF CLAY > FINES	=	6.0

METHOD

ASTM D 422-72 _____

OTHER _____

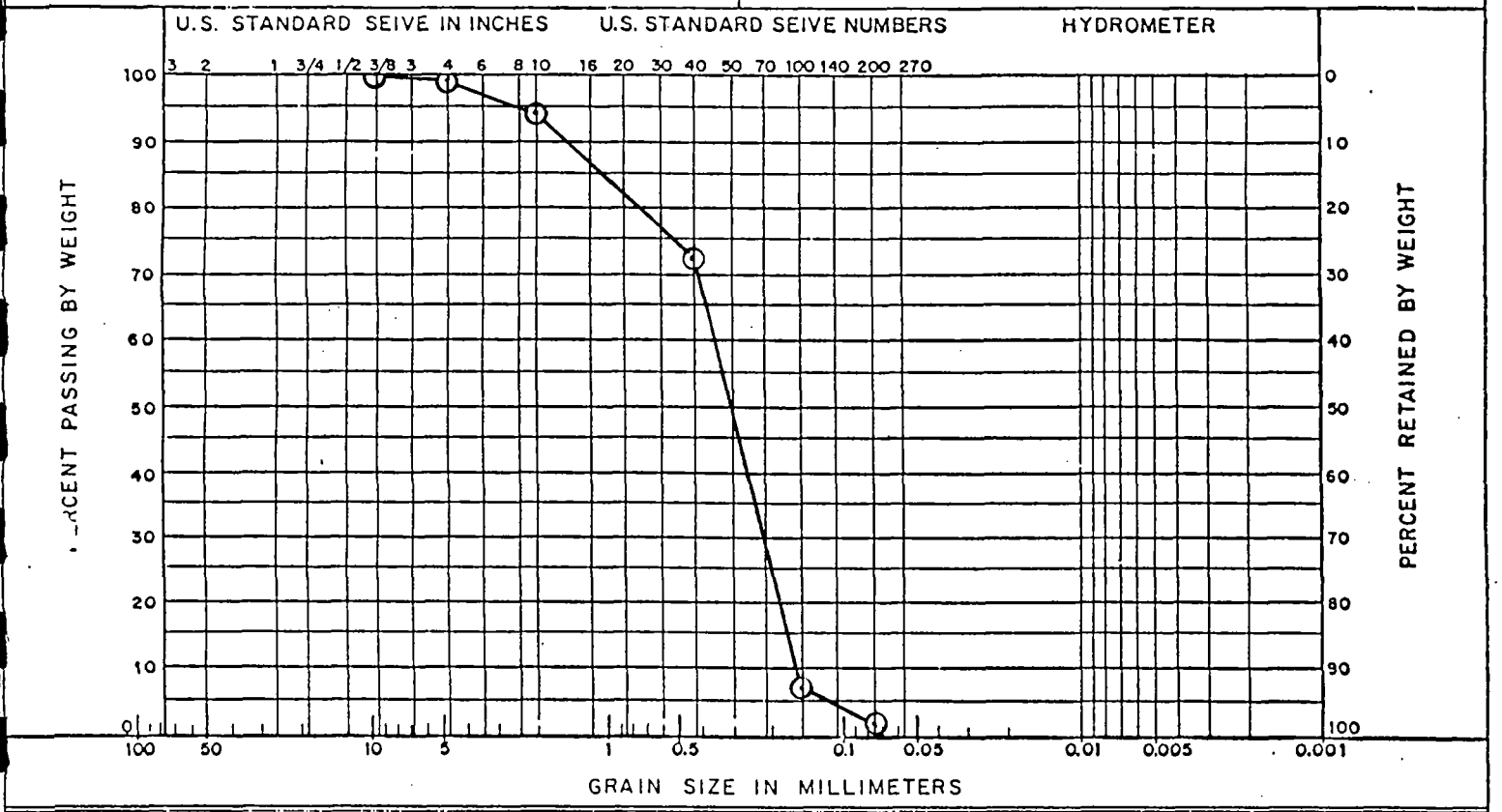
GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS _____

K&S TESTING & ENGINEERING INC.

GRAIN SIZE DIAGRAM



STANDARD									
UNIFIED	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
	COARSE	FINE	COARSE	MEDIUM	FINE			
ASTM	GRAVEL		SAND			SILT AND CLAY FINES		COLLOIDS
			COARSE	MEDIUM	FINE			
AASHO	GRAVEL			SAND		SILT	CLAY	COLLOIDS
	COARSE	MEDIUM	FINE	COARSE	FINE			

SIEVE ANALYSIS DATA

SEIVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECS.*	GRAIN SHAPE	
FM =					

*SPECIFICATIONS USED _____

T.B. NO. M-5 S. NO. S-14 DEPTH FT. 29.0-31.0 FILE NO. 220

DESCRIPTION: Gray, fine to coarse sand (SP)

DESIGN DATA

EFFECTIVE DIAMETER, D_{10}	=	
COEFF OF UNIFORMITY, $C_U = D_{60}/D_{10}$	=	
PERCENT MINUS 0.02 mm	=	
PERCENT OF BOULDERS	=	
PERCENT OF GRAVEL	=	1.0
PERCENT OF SAND	=	97.0
PERCENT OF SILT > FINES	=	2.0
PERCENT OF CLAY > FINES		

METHOD

ASTM D 422-72 _____

OTHER _____

GRAIN SHAPE KEY

A-WELL ROUNDED	D-SUBANGULAR	G-FLAKE
B-ROUNDED	E-ANGULAR	H-POROUS
C-SUBROUNDED	F-ELONGATED	I-_____

REMARKS _____

APPENDIX D

CATION EXCHANGE CAPACITY
TEST RESULTS

top-soil

P.O. BOX 340 • 27 ASH STREET • FRANKFORT, IL. 60423
(815) 469-2530

SOIL TEST RESULTS 01-Nov-88

for: K & S Testing & Engineering, Inc.
9715 Kennedy Ave.
Highland, IN 46322
ordered by: Dr. Satya Varadhi
dealer: Top-Soil

Sample I.D.	CEC meq/100 gram
SB-9, SS-9 19.0-21.0	4.35
SB-9, SS-7 15.0-17.0	5.49
M-5, SS-9A 20.0-20.5	5.10
-5, SS-7 .5.0-17.0	5.49
SB-10, SS-11A 29.5-30.5	4.71
SB-10, ST-1 25.0-27.0	5.27

Method: Ammonium Acetate

top-soil

P.O. BOX 340 • 27 ASH STREET • FRANKFORT, IL. 60423
(815) 469-2530

SOIL TEST RESULTS 01-Nov-88

for: K & S Testing & Engineering, Inc.
9715 Kennedy Ave.
Highland, IN 46322
ordered by: Dr. Satya Varadhi
dealer: Top-Soil

Sample I.D.	CEC meq/100 gram
SB-10, ST-1 25.0-27.0	6.75

Method: Sodium Acetate

top-soil

P.O. BOX 340 • 27 ASH STREET • FRANKFORT, IL. 60423
(815) 469-2530

SOIL TEST RESULTS 01-Nov-88

for: K & S Testing & Engineering, Inc.
9715 Kennedy Ave.
Highland, IN 46322
ordered by: Dr. Satya Varadhi
dealer: Top-Soil

Sample I.D.	CEC meq/100 gram
SB-10, ST-1 25.0-27.0	17.7

Method: Summation

Telephone (312) 544-3260

SUBURBAN LABORATORIES, Inc.

4140 LITT DRIVE HILLSIDE, ILLINOIS 60162 - 1183

EARL I. ROSENBERG
President

H.R. THOMAS, JR.
Director

May 6, 1986

K & S Testing and Engineering Inc.
9715 Kennedy Avenue
Highland, Indiana 46322

Attention: Mr. Dibakar Sundi,
Project Engineer

Samples Received: 4/29/86

Soil Samples / Griffith Landfill

	Cation Exchange (meq/100g)
S/L #6-4558 - Sample #1, Depth 0 - 2.0 ft.	5.64
S/L #6-4559 - Sample #2, Depth 2 - 3.5 ft.	5.55

ANALYSIS CERTIFIED BY: _____, Director(HRT/ak)

APPENDIX E

CHEMICAL ANALYSES OF GROUNDWATER SAMPLES

BPM INDUSTRIES
1150 Ju..ction Avenue - Schererville, Indiana 46375
1-219-322-2560 ● 1-800-428-3311

REPORT TO:
Petar Kostu
K & S Testing
9715 Kennedy Avenue
Highland, IN 46322

Date: 11/08/88
Recd: 10/24/88
WO #: 21-0196

FILE #220
Griffith Sanitary Landfil

Laboratory Smp ID No.:	1488-9	1489-9	1490-9	1491-9	1492-9	1493-9	1494-9
DESCRIPTION: ——> [Unless otherwise noted; results in parts per million - ppm]	M-1	M-2	M-3	M-4	M-5	M-1S	M-2S
PARAMETERS: ↓	10/24/88	10/24/88	10/24/88	10/24/88	10/24/88	10/24/88	10/24/88
COD	<1	<1	3.7	<1	<1	32.1	9.0
TOC	6.8	3.8	6.2	4.3	28.2	25.8	27.9
Total Iron	14.0	13.9	14.7	14.1	14.8	14.8	14.4
Total Dissolved Solids	608	598	583	742	1,072	1,199	314
Chloride	25.3	4.1	27.8	152.2	26.8	48.2	48.6
Hardness	485	443	524	464	822	1,118	844
pH	7.1	7.0	6.8	7.4	7.1	6.7	6.8

Certified by:

BPM INDUSTRIES
1150 Junction Avenue - Schererville, Indiana 46375
1-219-322-2560 ● 1-800-428-3311

REPORT TO:

Petar Kostu
K & S Testing
9715 Kennedy Avenue
Highland, IN 46322

FILE #220 Griffith Sanitary Landfill

Date: 11/08/88
Recd: 10/24/88
WO #: 21-0196

Laboratory Smp ID No.:	1495-9	1496-9	1497-9				
DESCRIPTION: —> [Unless otherwise noted; results in parts per million - ppm]	M-3S	M-4S	M-5S				
PARAMETERS: ↓	10/24/88	10/24/88	10/24/88				
COD	29	435	18.7				
TOC	38.2	86.8	47.8				
Total Iron	14.6	14.3	14.2				
Total Dissolved Solids	2,112	3,862	1,358				
Chloride	44.0	1,168	30.8				
Hardness	520	1,322	621				
pH	6.8	6.4	7.2				

Certified by:

BPM INDUSTRIES
1150 Jc. .tion Avenue - Schererville, Indiana 46375
1-219-322-2560 ● 1-800-428-3311

REPORT TO:

Petar Kostur
K & S Testing
9715 Kennedy Avenue
Highland, IN 46322

Date: 8/10/88
Recd: 7/28/88
WO #: 20-1353

Laboratory Smp ID No.:	5868-8	5869-8	5870-8	5871-8			
DESCRIPTION: —> (Unless otherwise noted; results in parts per million - ppm) PARAMETERS: ↓	M-1	M-2	M-3	M-4			
Total Dissolved Solids	560	388	362	616			
Chloride	<1	<1	28	84			
COD	107	76	122	57			
Hardness	461	422	494	394			
TOC	4.4	2.1	10.6	1.7			
Total Iron	21.972	17.872	54.122	17.872			
pH	7.2	7.0	6.9	7.1			

Certified by: Carl L. Gunter

BPM INDUSTRIES
1150 Ju ..ion Avenue - Schererville, Indiana 46375
1-219-322-2560 ● 1-800-428-3311

REPORT TO:
Petar Kostur
K & S Testing
9715 Kennedy Ave
Highland IN 46322

FILE # 220 Griffith Sanitary Landfill

Date: 5/12/88
Recd: 4/28/88
WO #: 20-724

Laboratory Smp ID No.:	3734-8	3735-8	3736-8	3759-8			
DESCRIPTION: ——>	M-1	M-2	M-3	M-4			
[Unless otherwise noted; results in parts per million - ppm] PARAMETERS: ↓							
COD	108	85	170	3.7			
Total Organic Carbon	2.88	1.92	10.5	1.92			
Total Iron	15.2	12.9	46.1	12.2			
Total Dissolved Solids	588	602	672	1006			
Chloride	27.9	9.29	55.7	130.			
Hardness	468	428	488	364			
pH	7.4	7.4	7.1	7.5			

Certified by:

TENCO LABORATORIES
BPM INDUSTRIES
1150 Junction Avenue - Schererville, Indiana 46375
1-219-322-2560 ● 1-800-428-3311

REPORT TO:
Petar Kostur
K & S Testing
9715 S. Kennedy
Highland, IN 46322

Date: 2/8/88
Recd: 1/26/88
WO #: 20-113

Laboratory Smp ID No.:	1441-8	1442-8	1443-8	1444-8			
DESCRIPTION: —> (Unless otherwise noted; results in parts per million - ppm) PARAMETERS: ↓	M1	M2	M3	M4			
Total Dissolved Solids	620	473	590	602			
Chloride	36.3	13.6	45.4	118			
Hardness	460	404	452	372			
Total Organic Carbon	7.12	5.93	7.12	1.19			
COD	100	35.3	89.9	18.7			
Total Iron	29.3	19.8	36.4	12.2			

Certified by:

BPM INDUSTRIES
1150 Jun[illegible]ion Avenue - Schererville, Indiana 46375
1-219-322-2560 ● 1-800-428-3311

REPORT TO:

Petar Kostur
K&S Testing
9715 Kennedy Ave.
Highland, IN 46322

Date: 11/18/87

Recd: 10/30/87

WO #: 19-1632

Laboratory Smp ID No.:	6725-7	6726-7	6727-7	6728-7			
DESCRIPTION: ——>	M-1	M-2	M-3	M-4			
Unless otherwise noted; esults in parts per illion - ppm] PARAMETERS: ↓							
Total Dissolved Solids	646	790	612	588			
Chloride	17	3.8	33	89			
Hardness	424	408	444	352			
COD	105	93	192	44			
Total Organic Carbon	2.30	1.17	7.55	0.80			
Total Iron	20.6	22.3	43.7	6.71			

Certified by: Eric L. Peterson

GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: K & S Testing & Engineering
3623 43rd Street
Highland In 46322

ATTN: Mr. Dibakar Sundi

DATE: 06/29/87

RE: Griffith Landfill
Field Blank
Sample Date: 06/05/87
Date Received: 06/05/87
GCL Number: 107072

GCL #	PARAMETERS	ANALYST		RESULTS	
107072	Chemical Oxygen Demand Dissolved	sah	<	5	mg/l
107072	Chlorides, Dissolved	lam	<	1	mg/l
107072	Hardness, Dissolved	el	<	10	mg/l
107072	Iron, Total	el	<	0.030	mg/l
107072	Solids, Total Dissolved	bt	<	10	mg/l
107072	Total Organic Carbon Dissolved	gvs	<	1.0	mg/l
107072	Total Organic Carbon Dissolved Duplicate	gvs	<	1.0	mg/l

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ANALYTICAL REPORT

TO: K & S Testing & Engineering
3623 43rd Street
Highland In 46322

ATTN: Mr. Dibakar Sundi

DATE: 06/29/87

RE: Griffith Landfill
MW-1
Sample Date: 06/05/87
Date Received: 06/05/87
GCL Number: 107073

GCL #	PARAMETERS	ANALYST	RESULTS	
107073	Chemical Oxygen Demand Dissolved	sah	8	mg/l
107073	Chlorides, Dissolved	lam	15	mg/l
107073	Hardness, Dissolved	bjw	1080	mg/l
107073	Iron, Total	bjw	24.1	mg/l
107073	Solids, Total Dissolved	bt	500	mg/l
107073	Total Organic Carbon Dissolved	gvs	3.3	mg/l
107073	Total Organic Carbon Dissolved Duplicate	gvs	4.0	mg/l

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ANALYTICAL REPORT

TO: K & S Testing & Engineering
3623 43rd Street
Highland In 46322

ATTN: Mr. Dibakar Sundi

DATE: 06/29/87

RE: Griffith Landfill
MW-2
Sample Date: 06/05/87
Date Received: 06/05/87
GCL Number: 107074

GCL #	PARAMETERS	ANALYST	RESULTS	
107074	Chemical Oxygen Demand Dissolved	sah	< 5	mg/l
107074	Chlorides, Dissolved	lam	4	mg/l
107074	Hardness, Dissolved	bjw	853	mg/l
107074	Iron, Total	bjw	19.1	mg/l
107074	Solids, Total Dissolved	bt	480	mg/l
107074	Total Organic Carbon Dissolved	gvs	4.9	mg/l
107074	Total Organic Carbon Dissolved Duplicate	gvs	5.6	mg/l

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ANALYTICAL REPORT

TO: K & S Testing & Engineering
3623 43rd Street
Highland In 46322

ATTN: Mr. Dibakar Sundi

DATE: 06/29/87

RE: Griffith Landfill
MW-3
Sample Date: 06/05/87
Date Received: 06/05/87
GCL Number: 107075

GCL #	PARAMETERS	ANALYST	RESULTS	
107075	Chemical Oxygen Demand Dissolved	lam	11	mg/l
107075	Chlorides, Dissolved	lam	28	mg/l
107075	Hardness, Dissolved	bjw	996	mg/l
107075	Iron, Total	bjw	17.3	mg/l
107075	Solids, Total Dissolved	bt	570	mg/l
107075	Total Organic Carbon Dissolved	gvs	6.1	mg/l
107075	Total Organic Carbon Dissolved Duplicate	gvs	6.9	mg/l

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ANALYTICAL REPORT

TO: K & S Testing & Engineering
3623 43rd Street
Highland In 46322

ATTN: Mr. Dibakar Sundi

DATE: 06/29/87

RE: Griffith Landfill
MW-4
Sample Date: 06/05/87
Date Received: 06/05/87
GCL Number: 107076

GCL #	PARAMETERS	ANALYST	RESULTS	
107076	Chemical Oxygen Demand Dissolved	lam	62	mg/l
107076	Chlorides, Dissolved	lam	90	mg/l
107076	Hardness, Dissolved	bjw	405	mg/l
107076	Iron, Total	bjw	6.80	mg/l
107076	Solids, Total Dissolved	bt	540	mg/l
107076	Total Organic Carbon Dissolved	gvs	2.4	mg/l
107076	Total Organic Carbon Dissolved Duplicate	gvs	2.5	mg/l